ANATOMY OF THE SHIP

THE AIRCRAFT CARRIER *HIRYŪ*

飛龍

Complete with more than **600 scale drawings** and **400 colour 3D views**

Stefan Dramiński

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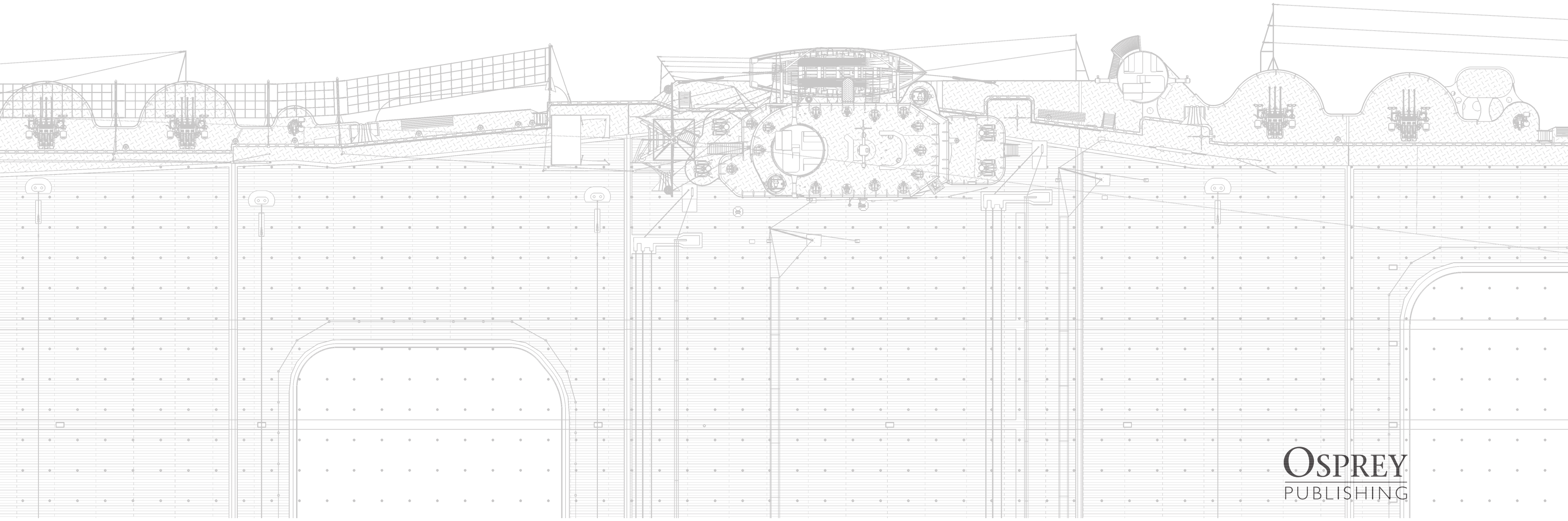

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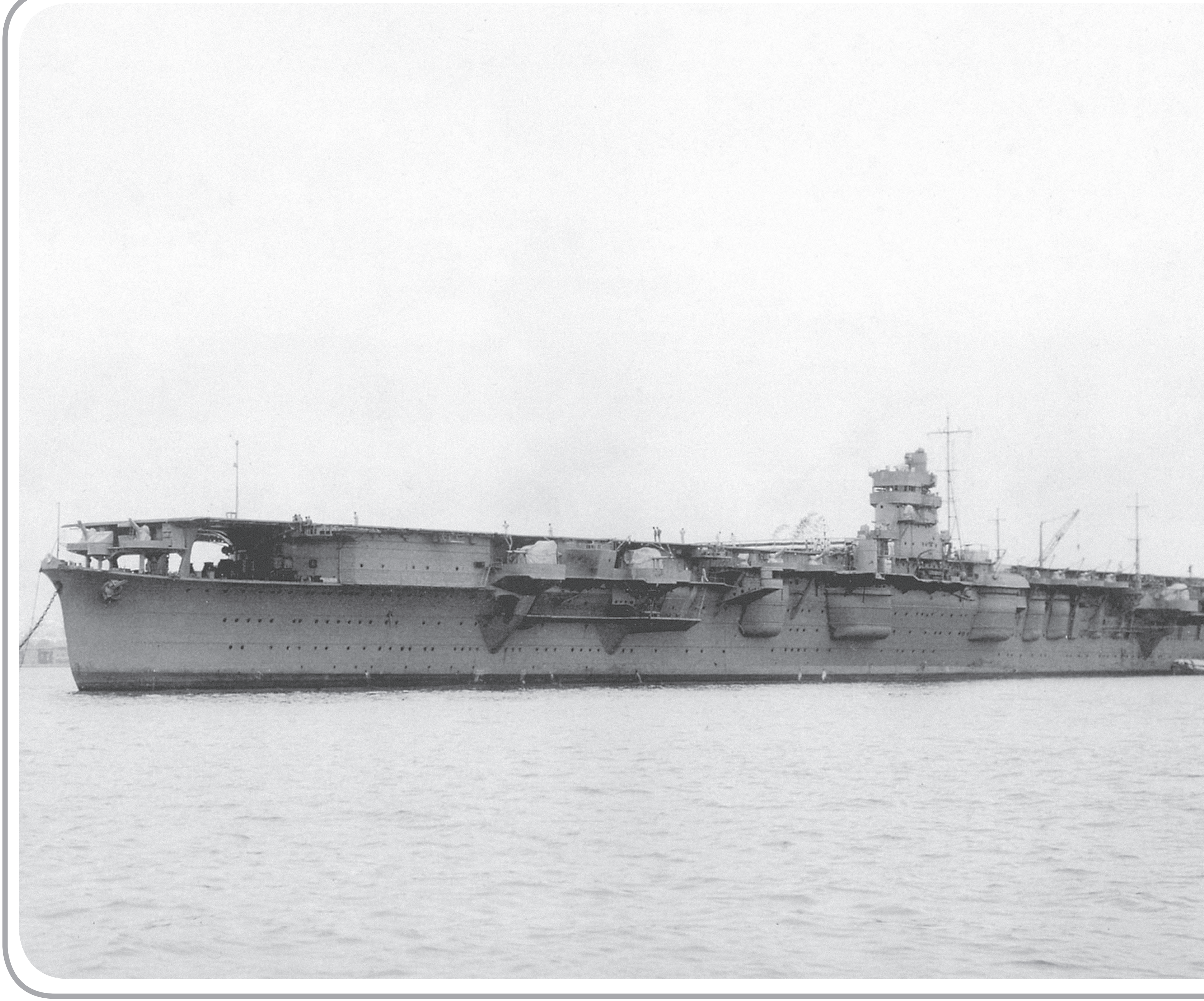

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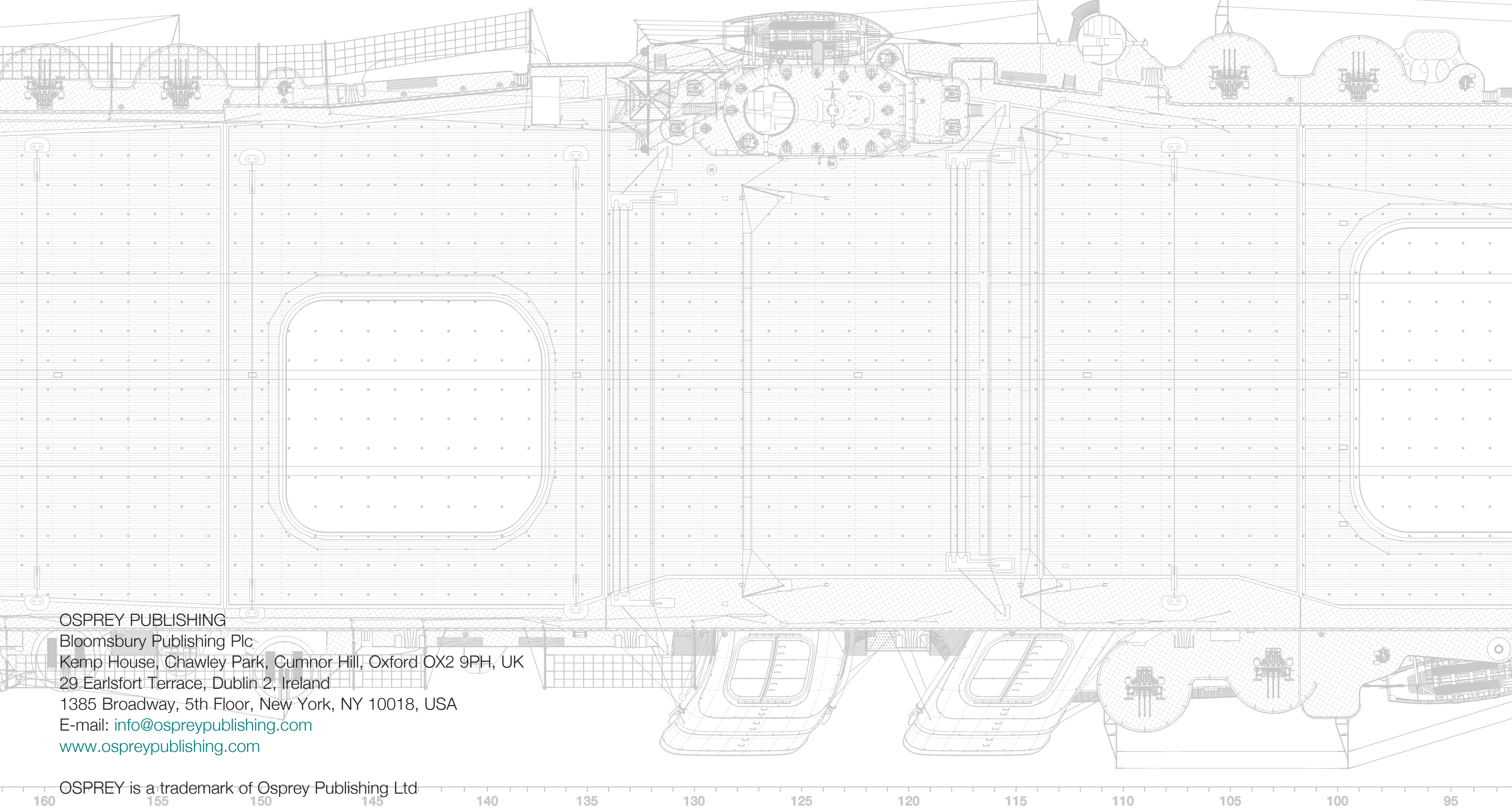

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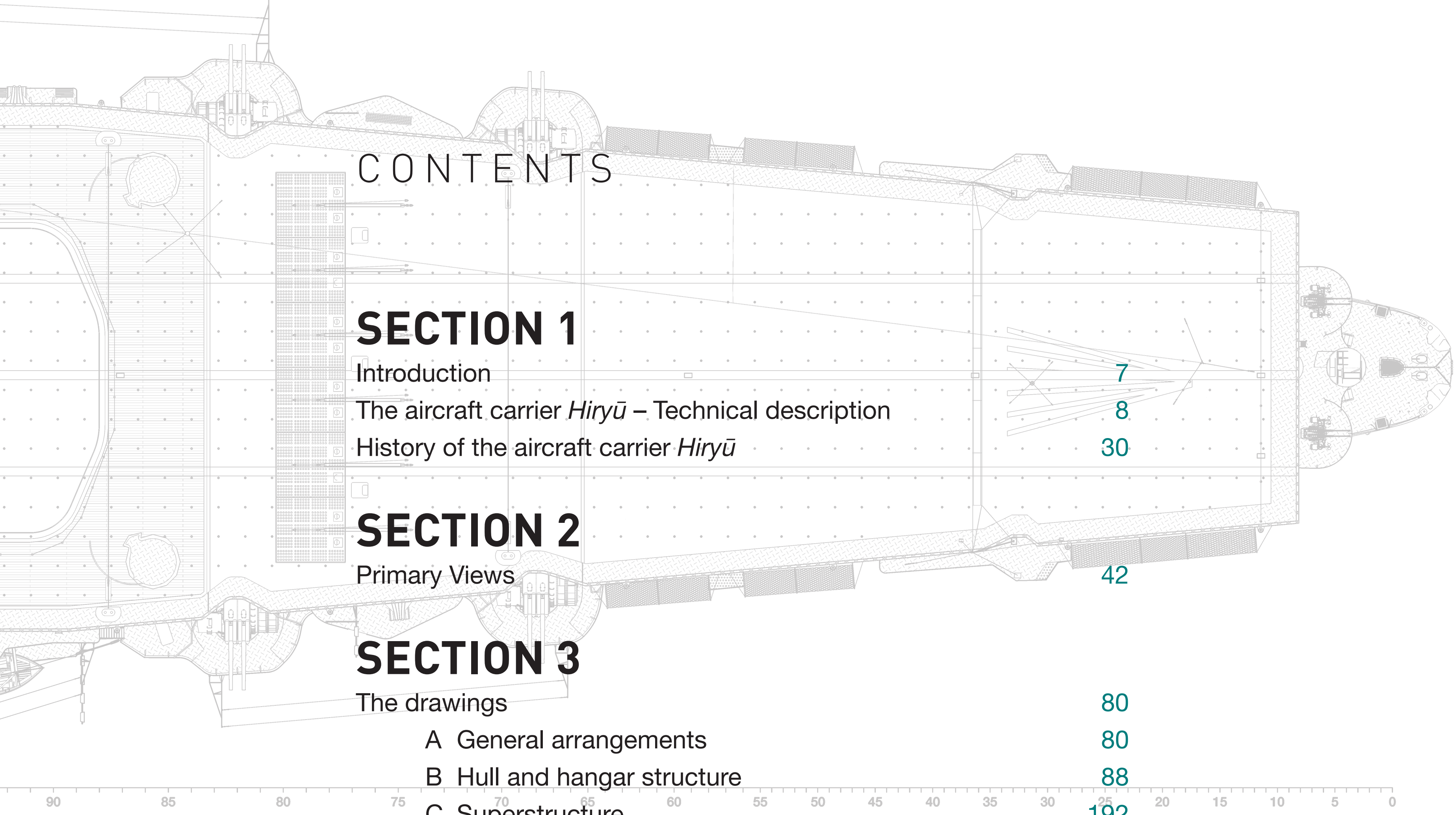

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INTRODUCTION

When commissioned in 1939, the aircraft carrier *Hiryū* was the most modern vessel of this type in the Imperial Japanese Navy. On 7 December 1941, she participated in the famous attack on Pearl Harbor that started the Pacific War. In the course of the next months the Japanese carrier force conducted offensive operations with little resistance from the Allies. But things would soon change at the battle of Midway, where three Japanese aircraft carriers were put out of action in a single devastating attack on the morning of 4 June 1942. Left alone on the battlefield, *Hiryū*'s crew put up a gallant fight against the American forces but ultimately fell victim to enemy dive bombers, thus completing what would become one of the most disastrous defeats in naval history. The only ship ever to bear this name, *Hiryū* lies at the bottom of the Pacific, her wreck still waiting to be discovered.

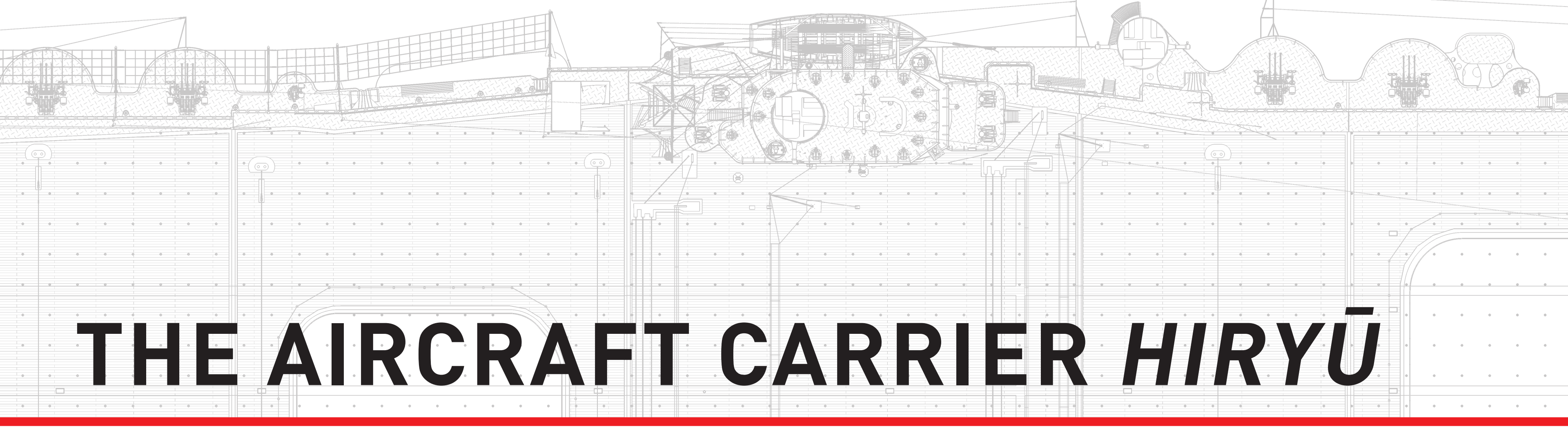
By complete coincidence, this publication is bound to be released almost exactly on the 80th anniversary of the battle of Midway. May it become a commemoration of all men who fought and died during this pivotal engagement.

Researching Japanese ships has always been a challenging task. Very limited number of surviving photographs, the language barrier and the Japanese tendency to maintain utmost secrecy are the key obstacles. It must also not be forgotten that Japanese vessels very often had unusually complicated designs, and things get even worse in the case of the asymmetrical form of an aircraft carrier. Fortunately, it turned out that *Hiryū* is one of the better documented ships of her era, and surviving shipyard drawings were just enough to create a highly detailed reconstruction, both in terms of external appearance and internal structure. Hopefully this publication will contribute to better recognition of the challenges and difficulties that the Japanese aircraft service crews faced in the fateful morning hours of 4 June 1942.

The skills acquired during the Japanese courses that I took over the years proved to be essential when conducting research for this project. For the readers interested in the Japanese language, captions for key elements are bi-lingual. Original names of multiple items have been included along with their romanized readings.

There are numerous people who kindly helped me when I was working on this book, providing both source materials and valuable advice. I would like to thank the following individuals: Takao Ishibashi, Lars Ahlberg, Mutsuo Uchiyama, Jan Dohmen, Takumi Kamakura, Jon Parshall and Mike Wenger. My wife Iwona handled the design of the book and the front cover image, which greatly enhanced the final effect. I would also like to honour the memory of late Janusz Skulski, notable author and researcher. His work was once my source of inspiration and object of admiration. Years later Janusz became my mentor, work partner and friend. His input into better understanding of the Imperial Japanese Navy ships' technical details will not be forgotten.

Stefan Dramiński
Toruń, Poland, January 2022



THE AIRCRAFT CARRIER *HIRYŪ*

The first half of the 20th century saw the birth of a new type of warship: the aircraft carrier. Japan, a country quickly catching up with the Western powers, soon became one of the pioneers of carrier construction. The world's first ship built as an aircraft carrier, *Hōshō* (鳳翔, *Flying Phoenix*), was commissioned in 1922. The Washington Naval Treaty was signed the same year, putting a limit on the displacement of Japanese capital ships. As a result, the hulls of the battleship *Kaga* (加賀, a Japanese province name) and battlecruiser *Akagi* (赤城, a mountain) were modified and completed as large aircraft carriers. However, their triple flight deck layout turned out to be impractical and both vessels were heavily reworked in the 1930s.

Another chance to gain priceless experience for the Japanese was the construction of *Ryūjō* (龍驤, *Prancing Dragon*). Commissioned in 1933, she was a small carrier permitted under the terms of the Washington Treaty. Plagued with numerous defects, mainly related to her excessive top-heaviness, this carrier was a good example of what mistakes not to make. In the meantime, another naval conference was held, concluded by the signing of the London Treaty in April 1930. Its immediate consequence was that the total displacement limit set for Japanese carriers (81,000 tons) included all four ships of this type, thus leaving only 12,630 tons to be used. This figure could be increased to 21,000 tons provided that *Hōshō* was decommissioned. Furthermore, the main gun calibre of a carrier could not exceed 155mm.

In the early 1930s, the Japanese received intelligence reports stating that the United States was planning to build flying deck cruisers. Designed as hybrids, these ships were supposed to combine a heavy cruiser's 20cm guns with a long flight deck for take-off and landing. In order to oppose these ships, the Imperial Japanese Navy Technical Department (艦政本部, Kansei Honbu) decided to prepare its own design of such a cruiser. The plans, labelled G6, were ready in 1932. The vessel had a projected standard displacement of 12,600 tons and was 240m long. It would carry three twin 20cm turrets, six twin 12.7cm mounts and up to 70 aircraft. Eventually, the flying deck cruiser concept was abandoned in both the United States and Japan. Nevertheless, the G6 design became the basis of future work on Japanese aircraft carriers.

In 1935 it was concluded that the displacement available for new carrier construction under the terms of the London Treaty (20,100 tons) should be equally divided into two vessels. The Imperial Japanese Naval General Staff (軍令部, Gunreibu) issued the first highly unrealistic requirements, which included the mounting of five 20cm guns and 20 12.7cm guns, carrying around 100 aircraft and a maximum speed of 36 knots. These numbers were soon modified to five 15.5cm guns, 16 12.7cm guns and around 70 aircraft. The resulting design, labelled G8, was completed by late 1933. The new ship was officially confirmed on 20 March 1934, when the Second Naval Armament Replenishment Programme was approved by the National Diet. In reality, preparations for construction of the vessel had already been made a few months earlier at Kure Naval Arsenal (呉海軍工廠, Kure Kaigun Kōshō).

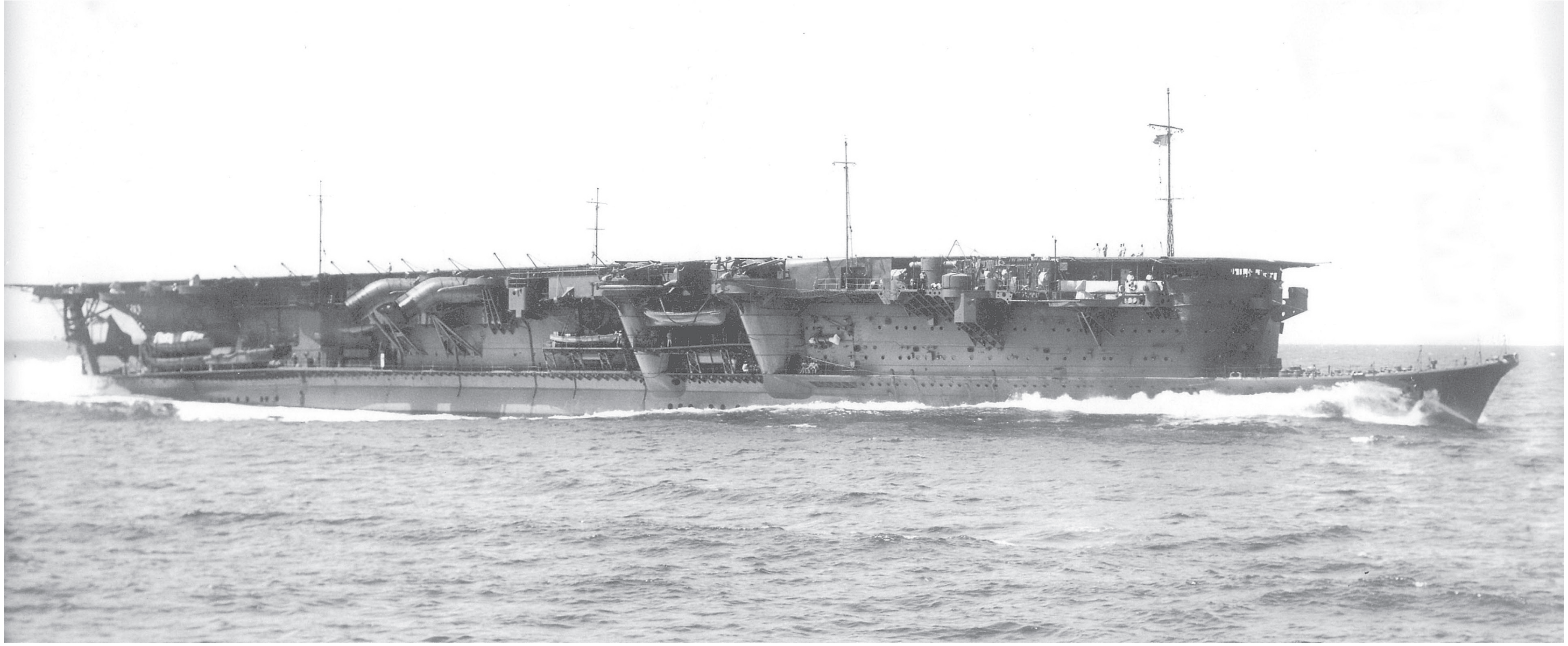
All work had to be stopped on 12 March 1934. On this day, a tragic accident happened to the torpedo boat *Tomozuru* (友鶴, *Friendly*

Crane), which capsized when performing a practice torpedo attack in heavy weather. This was a true eye-opener for the Japanese. Subsequent investigation revealed that the main cause of the accident was the top-heaviness of the ship. This, in turn, was the result of unreasonable requirements from the Naval General Staff, which were most often impossible to incorporate into the designs without exceeding either the given displacement limits or tolerable stability range.

It was realized that Japanese ships were simply overloaded with armament and equipment. Consequently, the new aircraft carrier's design had to be altered significantly. New versions of plans, labelled G9, were completed by October 1934, the most important change being the cancellation of low-angle guns. This proved to be a smart decision, as heavy guns aboard the carriers *Akagi* and *Kaga* turned out to be nearly useless. With a smaller superstructure, improved stability and lowered centre of gravity, the design would become the aircraft carrier *Sōryū* (蒼龍, *Blue Dragon*). Construction of the ship was completed on 29 December 1937, many months later than originally planned. *Sōryū* emerged almost 50 per cent larger than the official limit: her standard displacement of 15,900 tons was kept secret.

The second ship in the programme was designed on the basis of the prototype, but yet again, obstacles and delays got in the way. The most important of them was the Fourth Fleet Incident that took place in September 1935, when a major Japanese force (including *Hōshō* and *Ryūjō*) was caught by a typhoon during open-sea exercises. The result was heavy structural damage to many vessels. It was revealed that Japanese ships' hulls were not strong enough to resist the wave forces in heavy seas, with welded seams prone to cracking in extreme conditions.

These lessons had to be incorporated into the new design. Other factors were early experiences gained from *Sōryū*'s service and the process of rebuilding the *Kaga*. The outcome was the design G10, which was essentially a slightly enlarged and strengthened version of *Sōryū*, but with many important changes.



Light aircraft carrier *Ryūjō* running at high speed, 6 September 1934. The Japanese tendency to overload their ships with armament and equipment is evident in this photograph. The ship has a low freeboard and high-positioned centre of gravity, resulting in stability issues. Although *Ryūjō* was a failed design, there were some features that were repeated in *Hiryū*: downward-bent funnels, guns and directors placed on sponsons, side catwalks and decks falling down at the stern section. (Wikimedia Commons)

Principal Characteristics of *Hiryū*	
Displacement (standard)	17,300 tons
Displacement (full load)	21,900 tons
Length (overall)	227m
Length (waterline)	222m
Length (flight deck)	216.9m
Width (flight deck)	27m
Beam (waterline)	22m
Draught (at standard displacement)	7.5m
Draught (at full load displacement)	8.21m
Boilers	8 Ro Gō Kampon Type superheated 3-drum boilers (300°C, 21.7atm)
Turbines	4 Kampon Type steam turbine sets
Machinery output	153,000shp
Speed	34.59 knots
Fuel capacity	3,750 tons
Electrical plant output	1,600kW
Range	7,670nm at 18 knots
Protection	Ammunition and bomb magazines: sides 140mm NVNC tapering down to 50mm at the bottom, roof 46–65mm CNC Boiler rooms, engine rooms and torpedo magazine: sides 46mm CNC, roof 25mm CNC Top Deck: 14–75mm DS Avgas tanks: sides 50mm DS, roof 25mm CNC Steering gear compartment: sides and roof 56mm CNC, front and back 50mm DS
Armament	12 x Type 89 12.7cm (6 x II) 31 x Type 96 25mm (7 x III, 5 x II)
Aircraft	1941: 63 (18 x A6M2 plus 3 in reserve; 18 x D3A1 plus 3 in reserve; 18 x B5N2 plus 3 in reserve)
Complement	1,330 officers and men

The only parts that were left almost unmodified were the boiler and engine rooms. The new carrier had her beam and flight deck width increased, the island superstructure relocated to the port side and a different rudder type. Modifications to the hull included a new shape of the bow, more extensive riveting, an increase of shell plating thickness, the introduction of variable frame spacing and improvements to protection.

The shipyard awarded with the contract to build the vessel was the Yokosuka Navy Yard (横須賀海軍工廠, Yokosuka Kaigun Kōshō). Plagued by numerous difficulties, construction work was finally completed in mid-1939. The name for the ship was chosen in accordance with the tradition started with *Hōshō*, to call aircraft carriers after flying creatures. The vessel was to be christened *Hiryū* (飛龍, *Flying Dragon*).

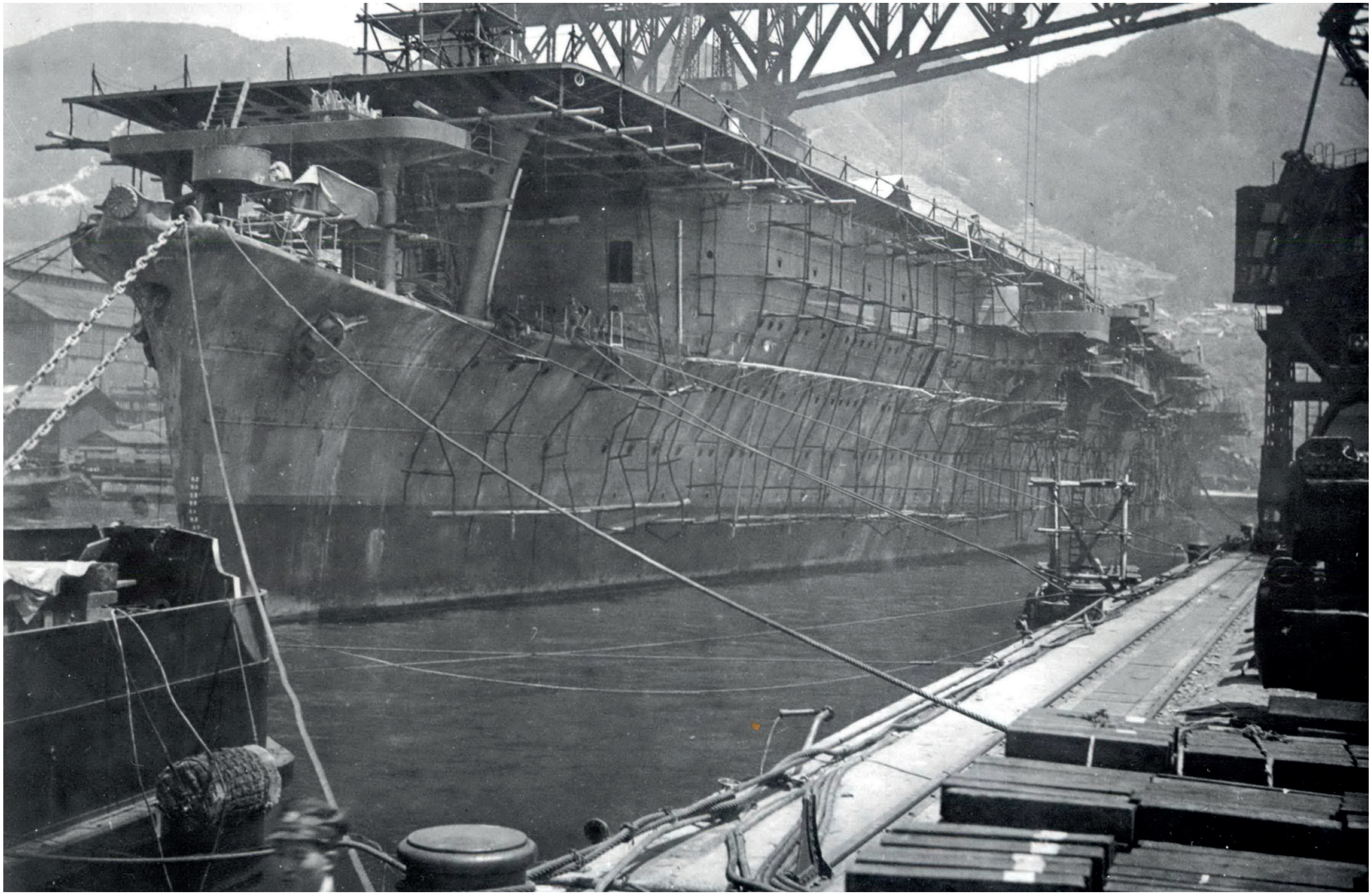
HULL STRUCTURE

Being planned as an aircraft carrier from the outset, *Hiryū*'s design was focused on what this type of ship needed most: high speed and enough hangar space for a strong air group. A cruiser-type hull was chosen as optimal for achieving these characteristics.

In general, most of the above-waterline part of the ship was occupied by two aircraft hangars placed one on top of the other. The underwater part of the hull comprised other vital compartments, and the basic layout worked out in *Sōryū* and *Hiryū* was similar in all subsequent Japanese carriers. Starting from the bow towards the stern, consecutive sections contained the following: fore trim tanks, fore heavy oil tanks, fore aviation gasoline tanks, fore ammunition magazines, fore bomb magazines, torpedo magazine, fore generator rooms, boiler rooms, engine rooms, aft bomb magazines, aft generator rooms, aft ammunition magazines, aft aviation gasoline tanks, aft heavy oil tanks, rudder room and aft trim tanks. As in preceding heavy cruisers, a four-engine and four-propeller layout was chosen as the optimal one.

Hull structure was improved and strengthened in comparison with *Sōryū*. After the Fourth Fleet Incident, it was decided to revert to riveting in all critical joints and the underwater part of the hull. Welded seams were not reliable enough with techniques available at the time. Outer plating was thicker than *Sōryū*'s in most areas. Variable frame spacing was used in order to save weight. Dense framing was applied in areas where more structural strength was needed (bow and stern), while amidships the distances between frames were somewhat larger.

Kure Naval Arsenal, early 1937. Construction of *Sōryū* is well advanced, with scaffolding surrounding the ship. The aircraft hangars and the flight deck have already been placed on the hull, but elements like gun mounts and directors are still missing. Note the distinct sheer at the forecastle. *Hiryū*'s hull was different and she would not have this feature.
(Wikimedia Commons)



Frame spacing of *Hiryū*'s hull

Frame numbers	Number of frame spaces within section	Frame spacing within section	Section length
0–55	55	0.6m	33m
55–72	17	0.9m	15.3m
72–99	27	1.2m	32.4m
99–135	36	1.12m	40.32m
135–137	2	1.11m	2.22m
137–139	2	0.9m	1.8m
139–147	8	1.2m	9.6m
147–149	2	1.11m	2.22m
149–151	2	1.2m	2.4m
151–153	2	0.9m	1.8m
153–159	6	1.2m	7.2m
159–165	6	1.11m	6.66m
165–173	8	1.2m	9.6m
173–185	12	0.9m	10.8m
185–191	6	0.8m	4.8m
191–262	71	0.6m	42.6m

To improve seaworthiness, the height of freeboard at the bow was significantly increased in relation to *Sōryū*. This resulted in a much lower sheer at the forecastle. At the stern, deck levels were falling, just like in Japanese heavy cruisers. In all other areas, decks were flat, which made the handling of aircraft in the hangars much easier.

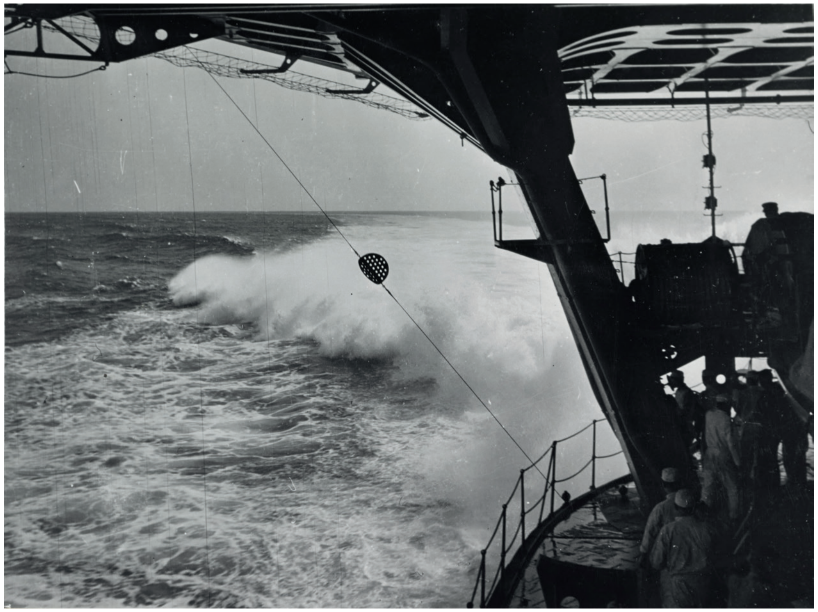
No underwater anti-torpedo bulges were fitted in *Hiryū* as they would have a negative impact on the ship's speed. The hull had a knuckle amidships at the lower deck level. Frames were bent outwards above this point to create large asymmetrical bulges containing funnel uptakes (starboard side) and the base of the island superstructure (port side). The carrier's stern was narrow, and large overhang platforms had to be added on both sides to fit all the planned boats.

Hiryū's bow had a peculiar double-curved shape, known as the Maier type. Its overhang at the bottom had a particular purpose. Early in the 20th century, the Japanese had developed a special type of mine that had steel cable connections with other mines. Enemy ships sailing through such a minefield would catch the cables and drag the mines to their hulls, while Japanese ships with different bow shapes would be left unharmed. This type of mine proved to be ineffective long before the Pacific War, and it was never used in combat. Still, many Japanese ships constructed in the 1930s had their stems unchanged.

On *Sōryū*, twin spade rudders angled outwards were used. Such an arrangement prevented the ship from heeling during tight turns. However, the same type produced negative effects when applied in destroyers (a speed reduction), and it was decided to shift to a single semi-balanced rudder in *Hiryū*. The result was not fully satisfactory – practical turning ability proved to be below expectations. The rudder had an electrohydraulic drive, but manual steering was also possible in emergencies. One outstanding characteristic of *Hiryū* was the size of her bilge keels. The stability issue became very important to Japanese designers, and it was decided to mount bilge keels that were almost 2 metres wide.

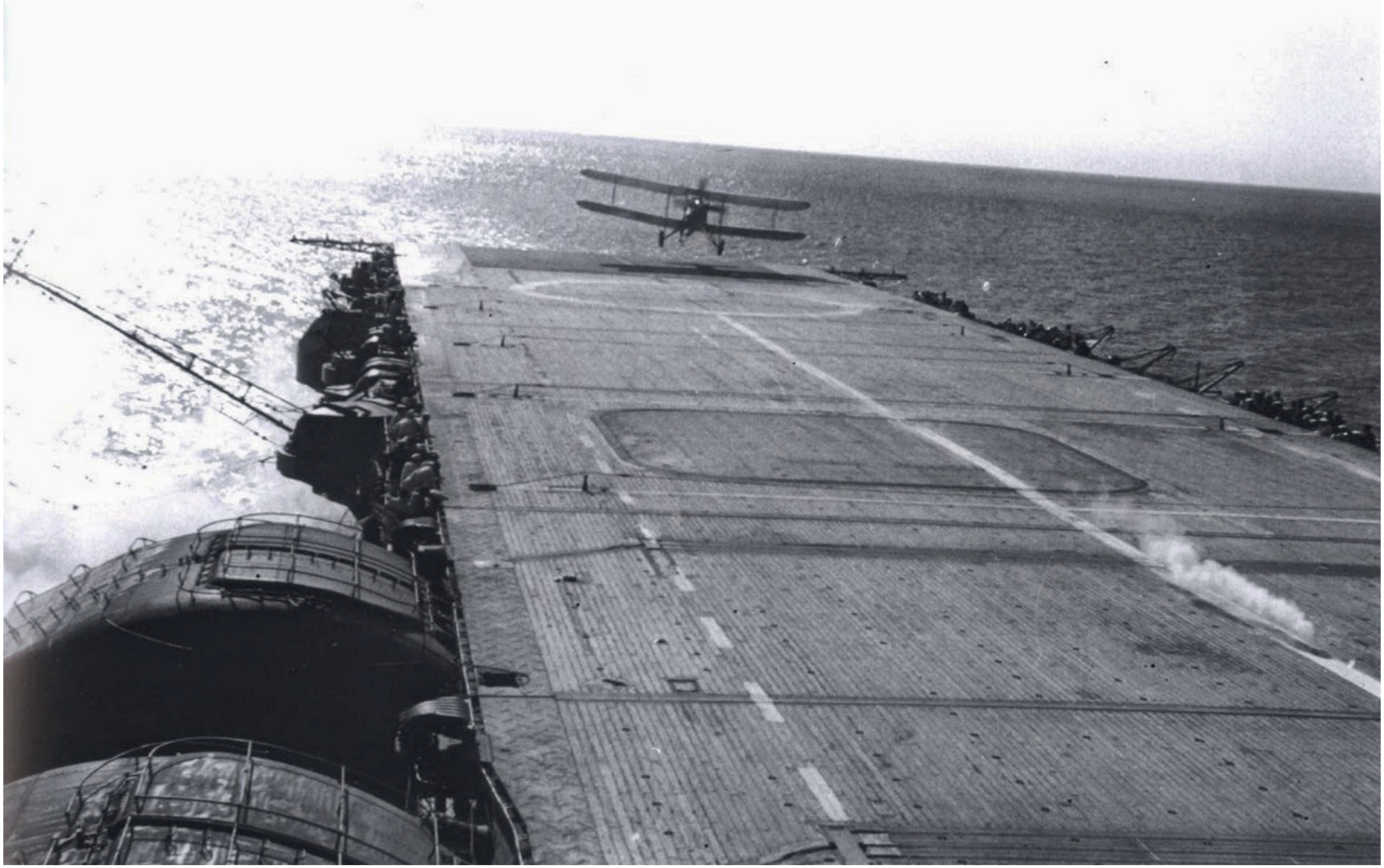
The most noticeable difference between *Hiryū* and *Sōryū* was the placement of the island superstructure. In *Sōryū* it was positioned on the starboard side, roughly one-third of the ship's length from the bow. Initial aircraft carrier service experiences seemed to indicate

Bungo Channel (between Kyūshū and Shikoku), 11 November 1937. *Sōryū* is producing an impressive wake while making over 30 knots during speed trials. The photograph was taken from the boat stowage platform on the stern, starboard side. Note the girders on the underside of the flight deck, crew safety nets, rudder signalling mark (centre) and speed signal light array (to the right).
(Wikimedia Commons)



that flight operations control would be more effective if conducted from a superstructure placed right in the middle of the flight deck's length. The starboard area was already occupied by funnels, so it was decided to put *Hiryū*'s superstructure on the port side. The amidships area gained a better weight balance with the funnels and island being placed on opposite sides. The only other aircraft carrier with such a highly unusual arrangement was *Akagi*. When *Hiryū* entered service, it turned out that her superstructure caused strong turbulence above the flight deck which made landing on the carrier difficult. Upon naval pilots' recommendation, port side placement of the island was never repeated in any Japanese carrier. Initially, Shōkaku-class carriers were planned with a similar superstructure positioning as *Hiryū*, but the design would be modified and the carriers were eventually completed with a starboard side island.

Hiryū's superstructure had five levels (one more than *Sōryū*), and was much more spacious. Its height improved the view over the bow



Bungo Channel, December 1937. A Type 92 Carrier Attack Bomber can be seen landing on *Sōryū* during trials. This aircraft was obsolete before the start of the Pacific War and would be replaced by newer models by 1941. Arrester gear stanchions are erected to raise the cables above the deck. A steam generator (to the right) is running to help the pilot evaluate wind direction. Funnels, shielded twin 25mm mounts and wire antenna masts (to the left) were almost identical in *Hiryū*.
(Wikimedia Commons)

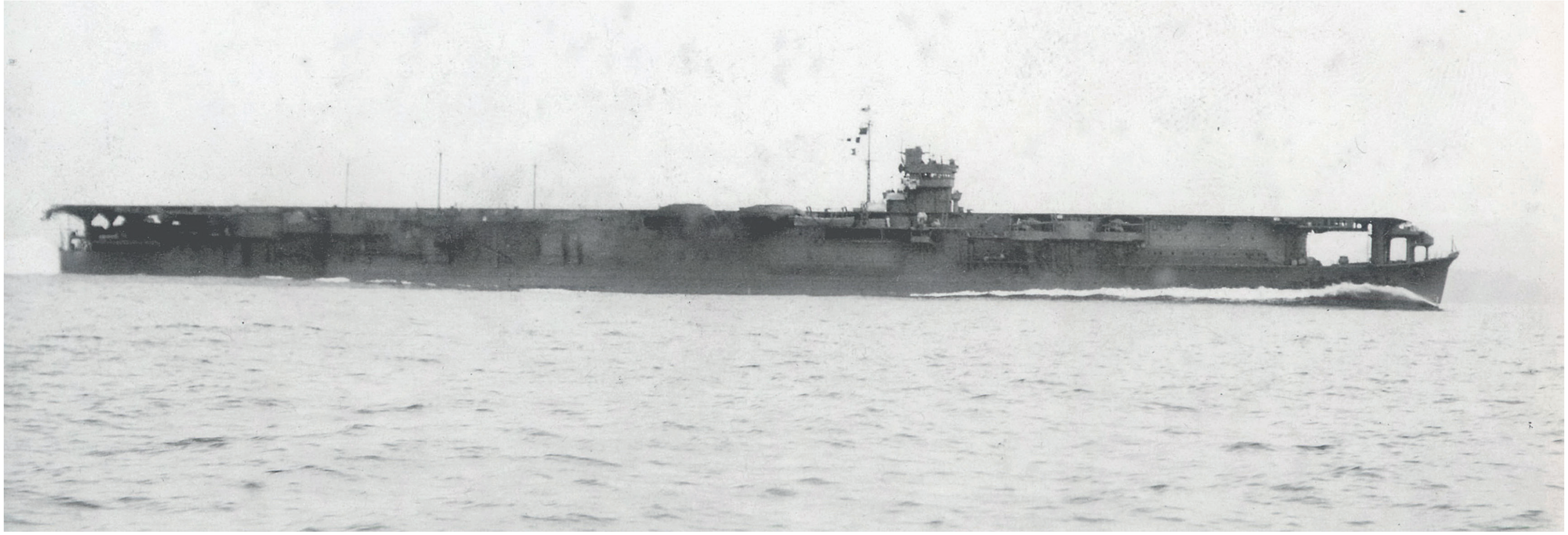
from the island's amidships position. After the first combat experiences had been gathered, it was realized that the bridges of Japanese carriers did not offer enough space to operate the ships effectively. The general tendency was to increase the size of the island in subsequent designs. *Hiryū*'s superstructure contained only essential compartments necessary for commanding of the ship, steering, navigation, signalling, wireless communication and flight operations control. It also had sea cabins for the admiral and the commanding officer, as well as room for various items of optical equipment (mainly fire control and lookouts).

Overall, *Hiryū* was considered a successful design. It only had a few drawbacks, all of which could be directly attributed to the medium size of the vessel's hull. These were insufficient protection, range and hangar space. The Japanese were well aware of these shortcomings, and the problems were solved in the subsequent Shōkaku class. *Shōkaku* (翔鶴, *Soaring Crane*) and *Zuikaku* (瑞鶴, *Lucky Crane*) were much larger ships, each with a standard displacement of 25,675 tons. The issue was that it took much more time and resources to build them. In the second half of 1942, a decision was made to mass-produce new aircraft carriers. The Unryū class was chosen as the dominant class. This design was largely based on *Hiryū*'s, with several important changes. The modifications included: cancellation of the middle elevator (to speed up construction and gain more hangar space), relocation of the superstructure to a starboard position forward of the funnels, replacing the single semi-balanced rudder with *Sōryū*-style twin spade rudders, adding more automatic anti-aircraft weapons and fitting newly developed types of radars. It was felt that construction of medium-sized vessels would be the most efficient way to rebuild the Japanese carrier force after it had been badly battered in the first year of the Pacific War.

PROTECTION

Due to *Hiryū*'s limited size and tonnage, the protection of her vital compartments was rather weak. Very little information on her armour layout can be found, and details vary from source to source. The following paragraphs contain the most probable data on the carrier's protection arrangements.

Ammunition and bomb magazines were the best-protected compartments of the ship. Their sides were covered with NVNC (New Vickers Non-Cemented) armour plates measuring 140mm at the top and tapering down to 50mm at the bottom. The armoured deck above



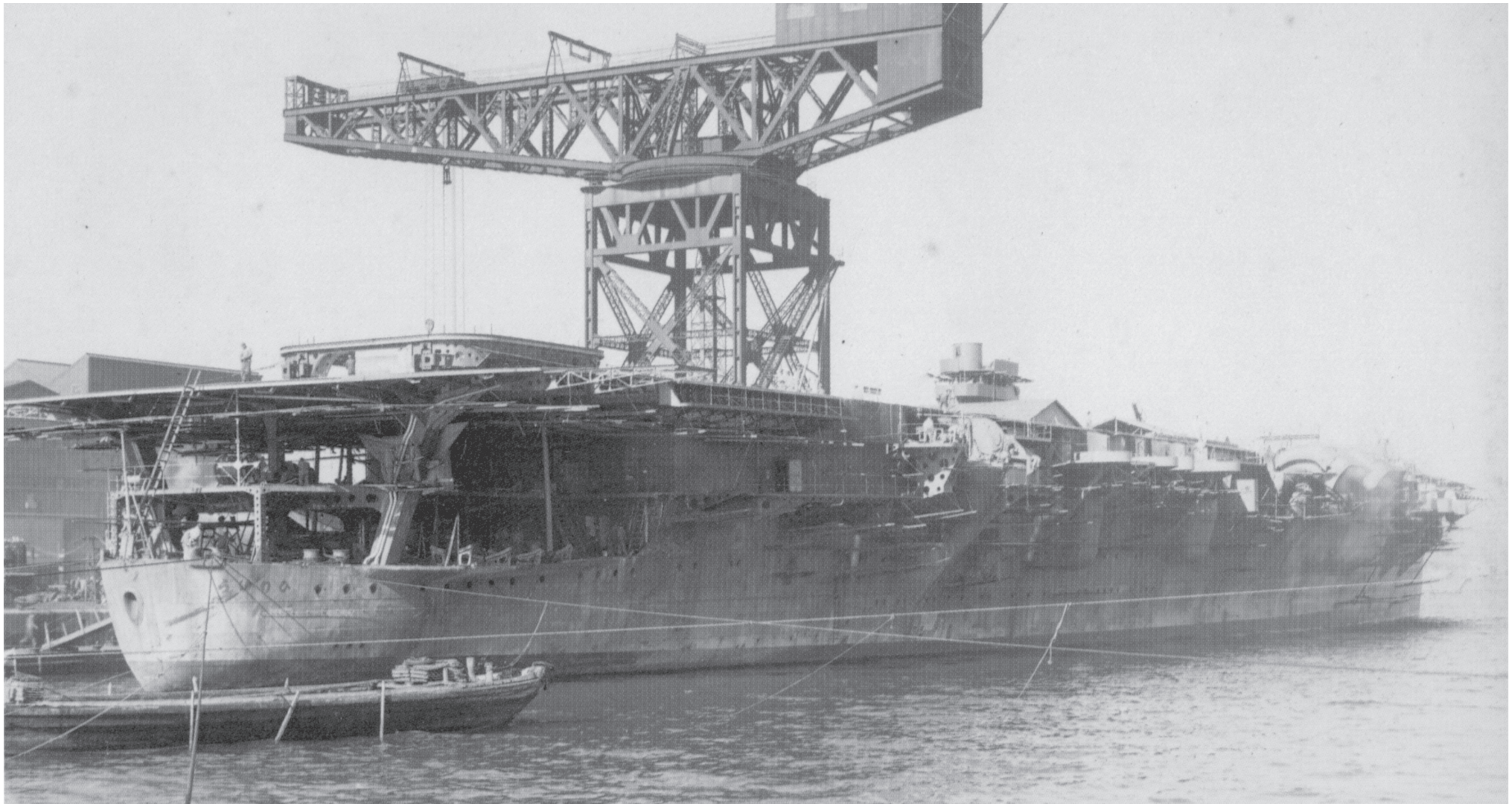
Waters off Tateyama (Bōsō Peninsula, Honshū), 22 January 1938. Seen from the starboard side, *Sōryū* is running at high speed during machinery trials. *Hiryū*'s silhouette was similar, but she had her superstructure positioned on the port side amidships, and a much higher freeboard at the bow. (Wikimedia Commons) the magazines was made of CNC (Copper Non-Cemented) and was 46–65mm thick.

The boiler rooms, engine rooms and torpedo magazine had the side protection of a 46mm CNC belt. The middle deck immediately above was built of 25mm-thick CNC plates. The top deck (upper hangar floor level) was the strength deck, consisting of several layers of DS (Ducol Steel) plates. Its overall thickness varied from 75mm outboard down to 14mm at the centreline.

Japanese designers seem to have underestimated the threat posed by the presence of aviation gasoline tanks within the hull. Both of *Hiryū*'s gasoline tank groups received only weak shielding consisting of two layers of 25mm DS plates on the sides and a single 25mm CNC plate on the top. A 1.4m-thick void space surrounding each tank formed an additional form of protection.

The steering gear compartment was enclosed with 56mm CNC plates (roof and sides), whereas its fore and aft bulkheads each consisted of two layers of 25mm DS plates.

The Imperial Japanese Navy was well aware that fire was the most serious threat to an aircraft carrier, which took various highly flammable and explosive materials on board: aviation gasoline, torpedoes, bombs and shells. However, the firefighting measures developed before the war proved to be largely ineffective. The first combat experiences, especially during the battle of Midway, prompted the Japanese to drastically modify the firefighting arrangements aboard their carriers.

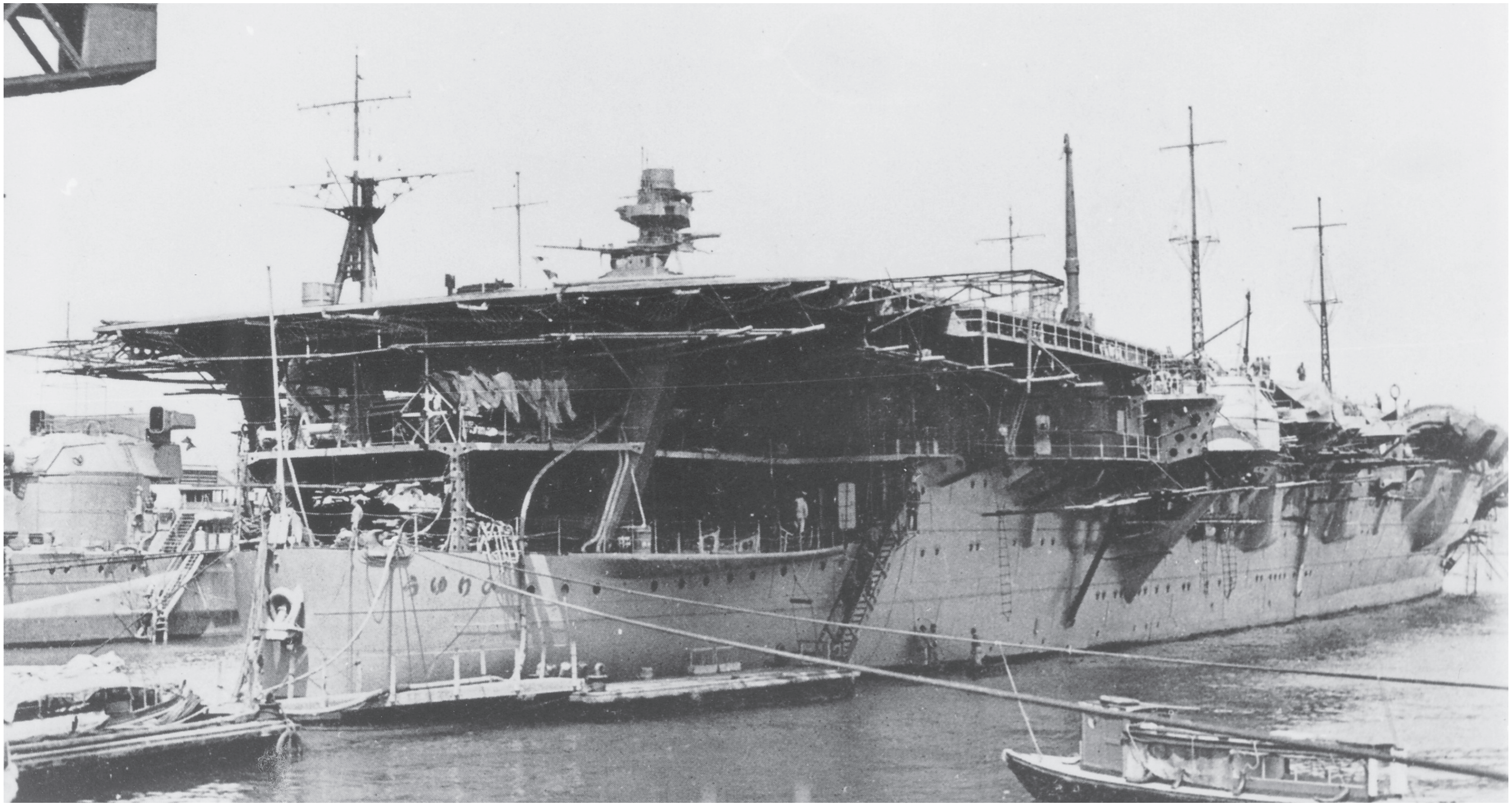


Koumi Basin, Yokosuka Naval Arsenal, 20 February 1939. *Hiryū* is being fitted out. The large 200-ton crane is lowering aircraft elevator no. 3 into its position in the rear portion of the flight deck. Funnels are surrounded by some smoke, an indication that the boilers are already being tested.
(© Lars Ahlberg 2021)

The firefighting system aboard *Hiryū* had to be adapted to counter the largest threat to the hangars – aviation gasoline fire. Therefore, carbon dioxide (CO_2) was chosen as the extinguishing agent. Gas bottles were stowed in the elevator pits and were connected with a perforated pipe system installed under the ceilings. The flow of CO_2 could be controlled from one of several firefighting centrals. Combat experience at Midway showed that such an arrangement did not work well when extinguishing fierce and rapidly spreading gasoline fires. As a result, the Imperial Japanese Navy switched to foam-based firefighting soon afterwards. Another drawback of the CO_2 system was that in the case of a control valve's malfunction, the hangar would become filled with gas quickly and unexpectedly. There were reportedly a number of fatal accidents of this sort in Japanese carriers.

In addition to the extinguishing gear, *Hiryū* had fire protection bulkheads fitted. Their purpose was to isolate a fire within a certain portion of a hangar and help fight it before it could spread. The bulkheads consisted of many narrow vertical steel plates covered with rock wool and asbestos. They were connected in such a way that they could be rolled out from their stowage position and moved across the hangar. Rollers were installed on each border line between an elevator and aircraft storage area. Lighter fire protection curtains were also used. Made of rock wool, they were rolled up under the ceilings and could be untied quickly in the event of a fire.

Koumi Basin, Yokosuka Naval Arsenal, 20 May 1939. Construction progress can be seen in this photograph taken exactly three months after the previous one. Wire antenna masts, an aircraft crane and stern anchor have been added, but starboard-side 25mm mounts are still not in place. Note the ship's name written in hiragana on the stern. The vessel behind *Hiryū* is the battleship *Mutsu*; her foretop director, mainmast and 41cm gun turret no. 3 are visible.
(© Lars Ahlberg 2021)



PROPULSION

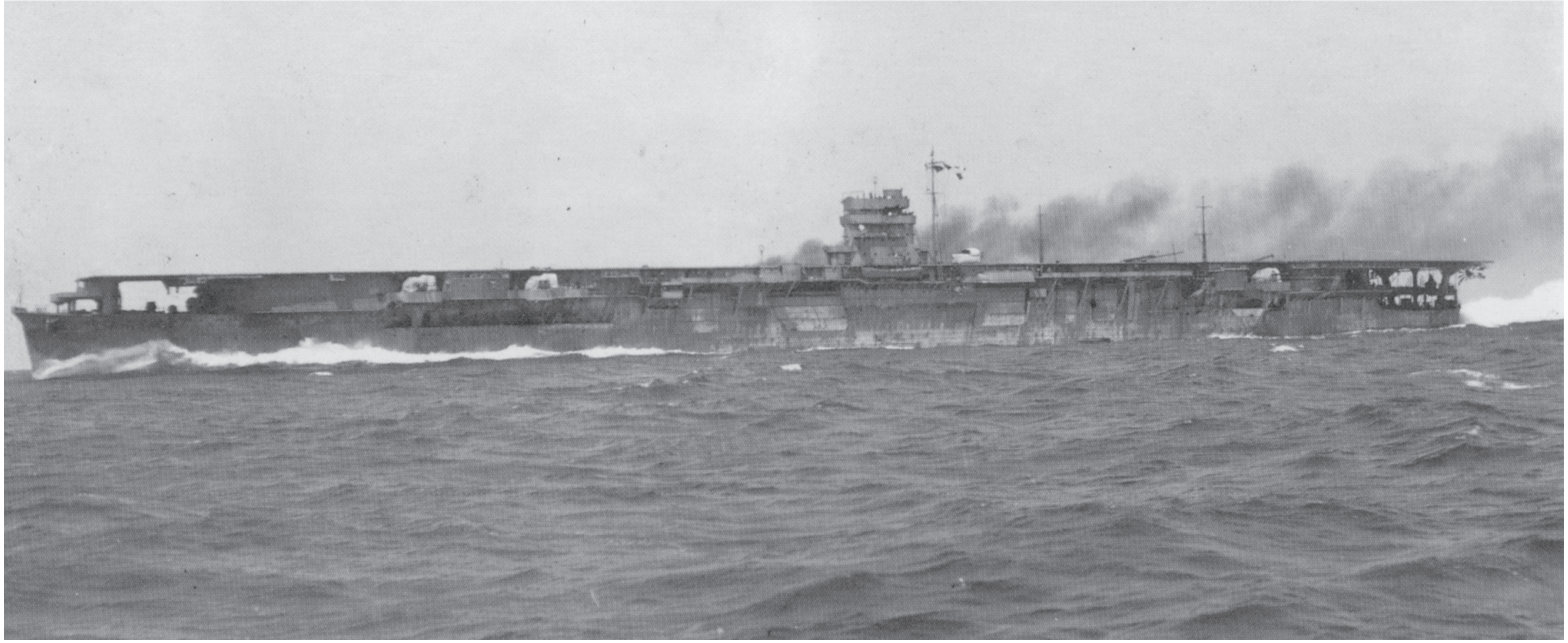
Propulsion for *Hiryū* was identical to that in the heavy cruisers *Suzuya* and *Kumano* (Mogami class), consisting of eight boilers in separate boiler rooms (fore) and four turbine sets in separate engine rooms (aft). The arrangement of turbines was slightly modified in the carrier: fore turbines drove the outer shafts and aft turbines drove the inner shafts, rather than the other way round as in the cruisers.

Boilers were of the Japanese-developed Ro Gō Kampon Type. These were oil-burning water tube boilers featuring air preheaters and steam superheaters. Each was capable of producing 107 tonnes of steam per hour (pressure 21.7atm, temperature 300°C).

Hiryū had four three-bladed propellers (diameter 3.9m). Each propeller shaft was driven by a Kampon Type steam turbine set, consisting of high pressure, intermediate pressure, low pressure and astern turbines. The two fore engine rooms also had cruising turbines fitted. The carrier's total machinery output reached 153,000shp, an increase of some 1,000shp in relation to *Sōryū*. The speed recorded during *Hiryū*'s trials – 34.59 knots – was not only the highest among the Imperial Japanese Navy's carriers, but actually no carrier in the world was capable of such performance at that time.

Hiryū's oil fuel capacity was 3,750 tons, which resulted in a rather moderate range of 7,670 miles at 18 knots. This meant that the ship needed relatively frequent refuelling during operations in the vast areas of the Pacific.

There were two steam line systems (main and auxiliary) running from the boiler rooms to the engine rooms. Several cross-connections were provided for emergency use. As in earlier Japanese carriers, boiler uptakes were angled towards the starboard side. Two downward-bent funnels were fitted outboard under the flight deck. This arrangement was unique to Japanese carriers and was an effort to keep hot gases and smoke away from the flight deck. During flight operations, a special sprinkler system inside the funnels was turned on in order to strengthen the effect, producing characteristic white smoke. Both funnels were fitted with steam pipes and top covers that could be opened in case of



Waters off Tateyama, 28 April 1939. *Hiryū*, still uncompleted, is conducting her first machinery trials. The 12.7cm gun mounts are already in place, but their director positions on top of the superstructure and in front of it are empty. The 25mm machine guns are also missing. Port-side wire antenna masts are still lying on the flight deck. (© Lars Ahlberg 2021) an emergency (for instance a heavy starboard list causing a hazard of flooding of the funnels). The downward-bent funnel layout was repeated in subsequent Unryū class carriers, while in others (the Hiyō class, *Taihō* and *Shinano*) the British/US style was adopted: a single tall funnel incorporated into a large superstructure.

Hiryū's boiler rooms and machinery spaces were provided with an air supply system. In order to save hangar space, the trunks were placed outside the hull, forming several characteristic bulges along both sides. In some publications on Imperial Japanese Navy carriers, including the Japanese-language ones, it is claimed that *Hiryū*'s engine rooms only had air supply trunks on the port side. This alleged design fault supposedly strongly contributed to the carrier's loss at Midway, when machinery spaces had to be abandoned after smoke and heat became unbearable. However, close examination of the carrier's deck plans reveals that this statement is not true. Each of the four engine rooms had two pairs of vent trunks, leading to both starboard and port side intakes. If *Hiryū*'s air supply system was indeed flawed, it was probably not by the lack of redundancy.

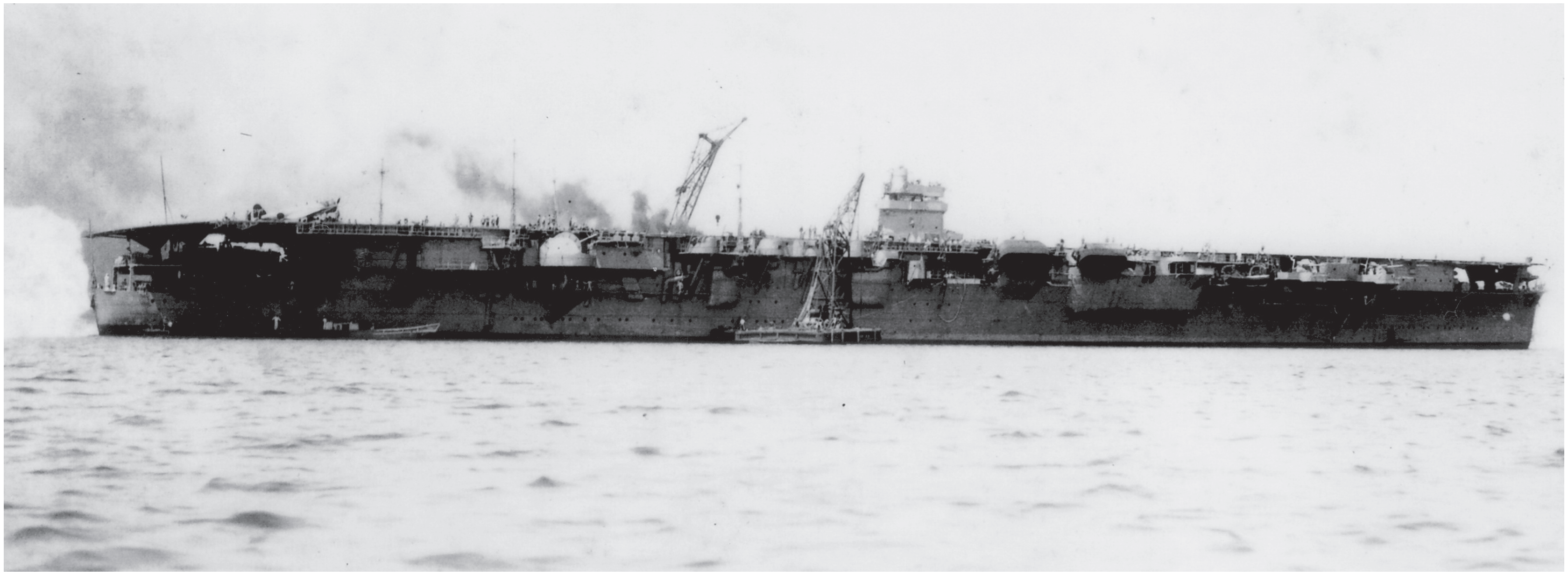
Power supply for the ship's elevators, rudder, arrester gear, guns, ammunition hoists, lighting, communications and other equipment was provided by electric generators located in the fore and aft generator rooms. Each of the three turbogenerators fed with steam from the boiler rooms had an output of 400kW. Two diesel generators, each capable of supplying 200kW, were also provided. The carrier's electric system operated on direct current and a voltage of 225V.

AIRCRAFT FACILITIES

Hiryū had two completely enclosed aircraft hangars, one atop the other. They took up most of the ship's length and each of them was two decks high. The sides of the upper hangar were thin. This was a deliberate measure: should an internal explosion take place, the walls were meant to be ruptured and vent the shockwave force sideways. However, as combat experience showed, this system didn't work as designed and Japanese carriers' flight decks usually suffered heavy structural damage when bombed by enemy aircraft.

The fore part of each hangar was usually occupied by fighters, the middle section by dive bombers and the rear area by torpedo bombers.

Yokosuka Naval Arsenal, 20 June 1939. A floating crane is moored alongside *Hiryū* and is in the process of loading supplies. Post-completion trials were scheduled to be conducted, starting the following day.
(© Lars Ahlberg 2021)



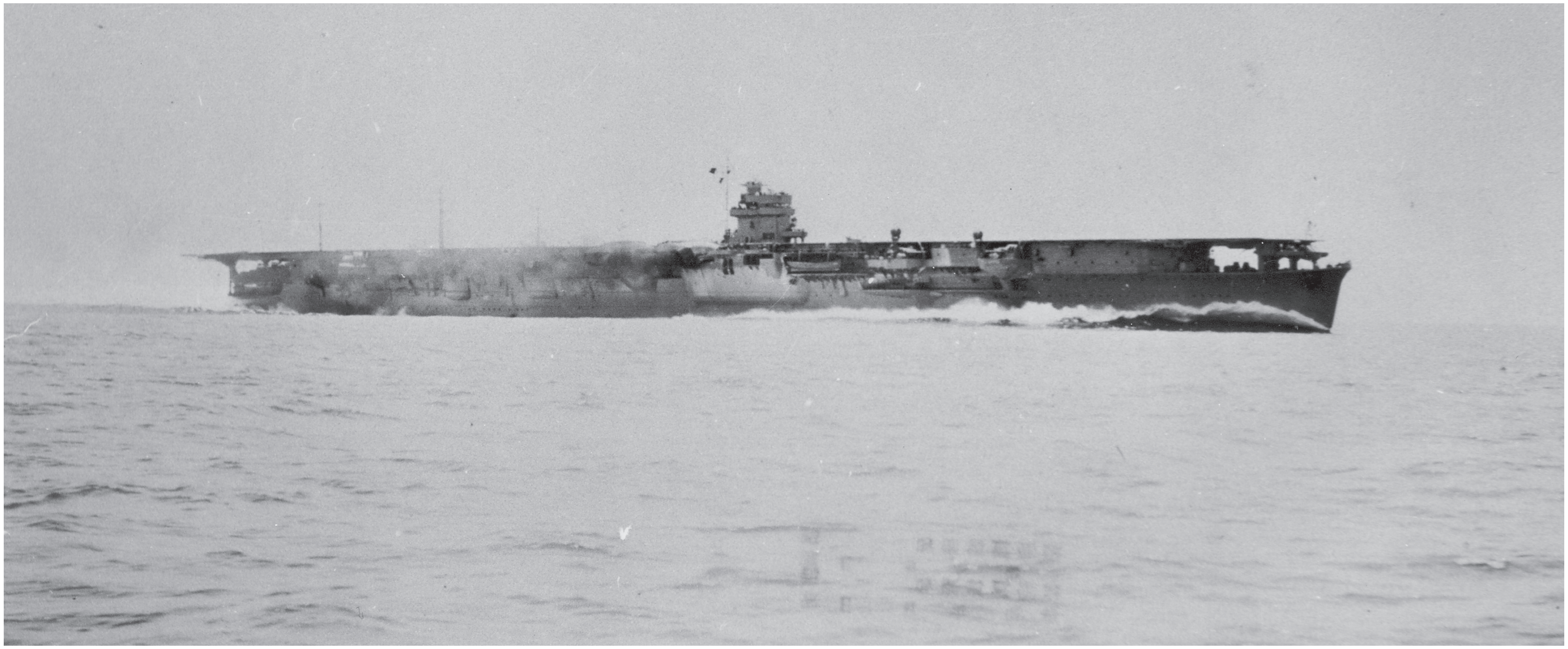
The reason for this was simple. The heavier an aircraft, the more length of runway it needed for take-off. Consequently, the heaviest aircraft had to be placed at the rear when a strike force was on the flight deck.

It was desirable to keep the hangars' shapes as straight as possible, but this was not always possible in the highly asymmetrical structure of a carrier. Although a clearance of 0.5m between parked aircraft was advised, it was often the case that the distance was much less. Fitting all the planned aircraft inside the ship was a difficult task and the hangars were very cramped spaces. Deck markings were painted at the points where aircraft wheels should stand for easier parking procedure. As the hangars were closed spaces where gasoline vapour was likely to accumulate, they needed good ventilation. *Hiryū*'s set of powerful fans was capable of complete air renewal inside the hangars within around ten minutes. Various types of equipment were attached to the hangar walls: spare aircraft propellers and tanks, lamps, firefighting gear and fuelling hoses.

For fast aircraft transport between the hangars and the flight deck, it was decided to mount three centreline elevators on *Hiryū*. Their platforms had to be large enough to fit the newest types of Navy aircraft with their wingtips folded. The elevator sizes (from bow to stern) were as follows: 13x16m, 13x12m and 11.8x13m. The fore elevator was mainly used for returning aircraft to the hangars, while the aft one was largely employed to lift them up. Each of the elevators had a main (300kW) and auxiliary (75kW) electric drive, which were capable of lifting a weight of 5 tonnes. In normal conditions it took 15 seconds to move the elevator platform from the lower hangar deck to the flight deck. The motors were placed in a pit one deck below the lower hangar. Steel cables fixed to the elevator platform were led through pulleys at the hangar bulkheads and wound on drums attached to the motors. Heavy counterweights were used to ensure smooth operation of each elevator. Hinged brackets were mounted on the underside of the elevator plane to secure it in place when it reached the flight deck. Friction brakes were also fitted in case of a malfunction.

The usual procedure was to arm and fuel the aircraft within the hangars, after which they were transported by the elevators to the flight deck.

Waters off Tateyama, 21 June 1939. Being fully armed and equipped, *Hiryū* made several high-speed runs to test her propulsion. She recorded 34.59 knots, making her the fastest carrier in the world at that time. Note the two 110cm searchlights on the flight deck raised from their wells below.
(© Lars Ahlberg 2021)



This practice was later abandoned after the catastrophic results it produced at Midway. Bombs and torpedoes were moved from their magazines to the hangars by small elevators. From there, transport was conducted by means of manually operated trolleys and overhead travelling hoists fitted to the I-beams on the ceilings. There were several fuelling points in each of the hangars; avgas was pumped to them from one of the two large tank groups through gasoline supply pipes.

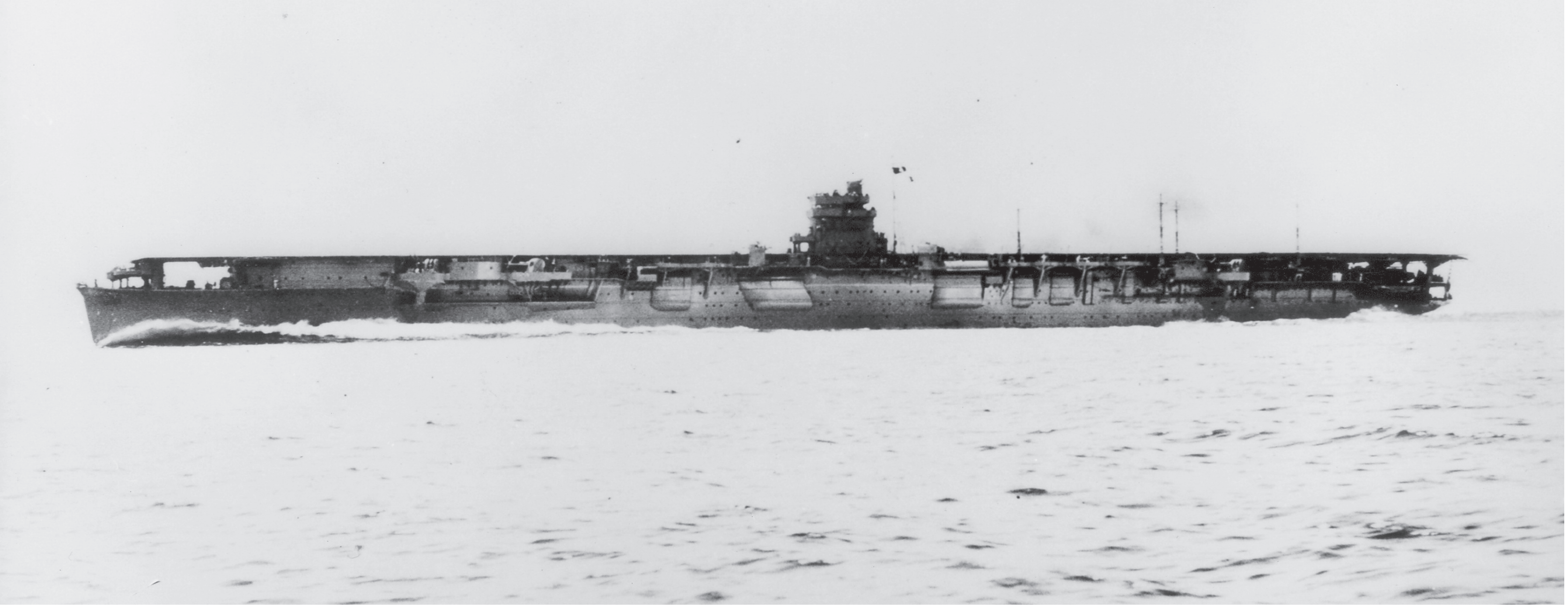
Hiryū's flight deck was positioned quite high above the waterline in order to fit two aircraft hangars below. Consequently, its construction had to be relatively light to avoid top-heaviness. A system of transverse and longitudinal girders was used as a support of the flight deck, giving it sufficient strength to sustain the stress of heavy aircraft hitting it during landing. There were eight expansion joints in the flight deck, dividing it into nine sections. This solution was introduced in order to neutralize the forces acting on the deck's light structure in heavy seas.

Most of the flight deck was covered with wooden planks. Exceptions were the foremost and aftermost sections, which were metal and covered with non-skid paint (resembling sandpaper). Crew's walkways at the sides were made of metal chequer plate. For easy disposal of rainwater, the flight deck had a 100mm camber, with gutters running along all edges.

For a safe and fast landing procedure for the heavy carrier aircraft, an arrester gear system was used. In total there were nine Kure Type, Model 4 sets fitted along *Hiryū*'s flight deck. Each of them consisted of a steel wire stretched across the deck, from where both ends were guided below-decks to the electromagnetic braking engines, located on the lower and bottom decks. The wire rotated on a steel drum, with the drum having a stator inside that opposed the motion. During the landing procedure, the cables across the deck were raised by small stanchions at each end to ensure that an aircraft's hook could catch the wire. Maximum aircraft weight for this system was 4 tonnes, maximum landing speed was 30m/s and retardation reached 2g. It took 12 seconds to reset a cable after a successful landing.

In addition to the arrester gear, two Kūshō Type fixed crash barriers and three portable crash barriers were fitted on *Hiryū*. Their purpose was to stop landing aircraft in case of an emergency and avoid a potentially catastrophic collision with other aircraft parked on the fore part of the flight deck. The working principle was generally similar to that of

Waters off Tateyama, 21 June 1939. Another photograph taken on the same day as the previous one, this time from the port side. The outboard ventilation duct housings are very visible in this shot.
(© Lars Ahlberg 2021)

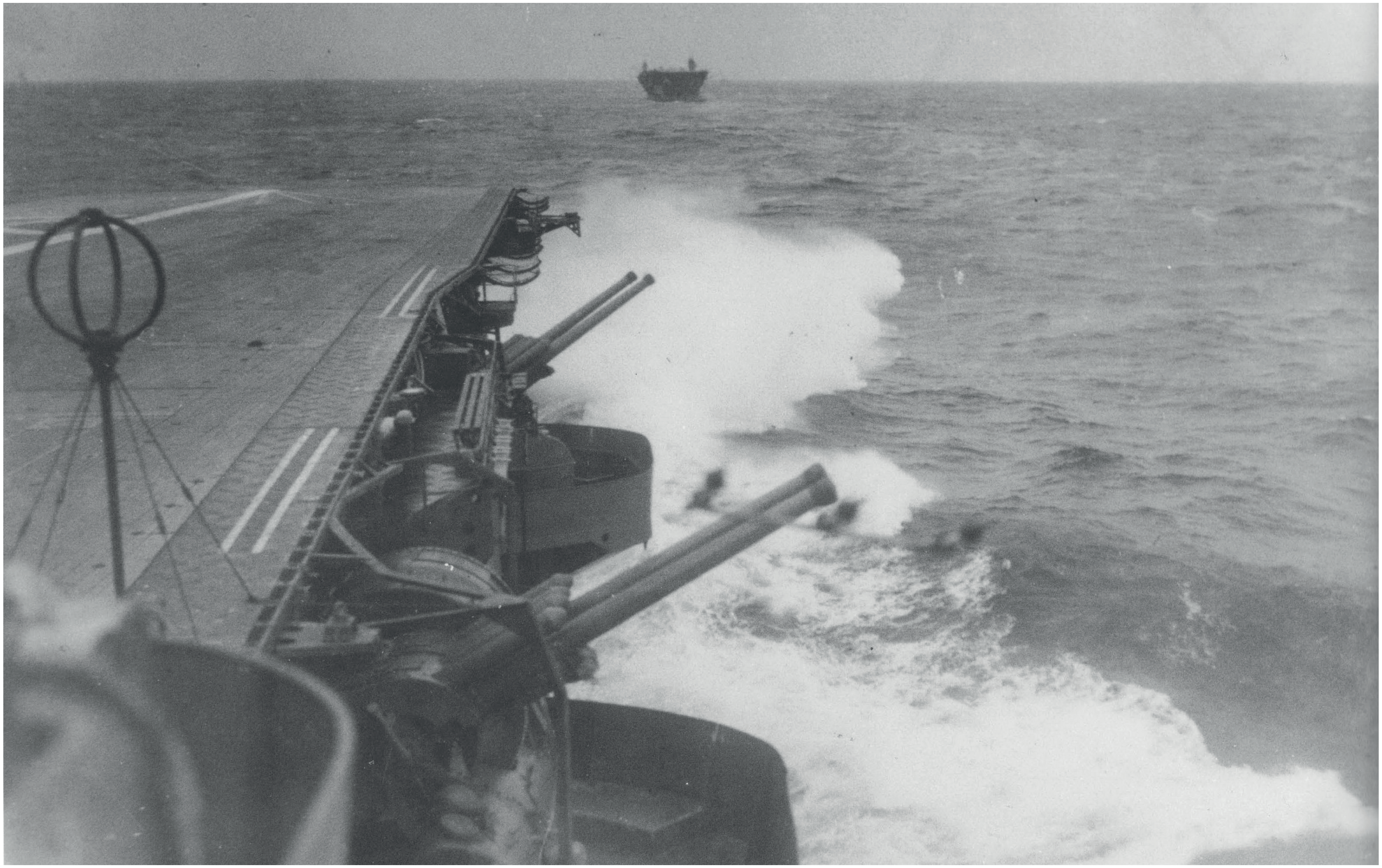


the arrester gear. The differences were the use of much stronger and taller (2m) stanchions and three wires instead of one. This gear contributed to an increased speed and safety of flight operations.

The risk of a situation where a landing aircraft accidentally fell overboard was highest in the amidships section. For this reason, both sides of the flight deck behind the superstructure and funnels were equipped with side safety nets.

Hiryū was provided with a windscreen that was meant to protect aircraft and crew from strong winds during preparations for take-off. It was placed right in front of the fore elevator and consisted of six perforated steel panels that could be erected using a hydraulic drive.

The flight deck and both hangar decks were equipped with rows of aircraft locking eye plates. Designed in such a way that they were flush with the deck, they enabled parked aircraft to be tied down and thus secured from any damage resulting from the ship's movement.



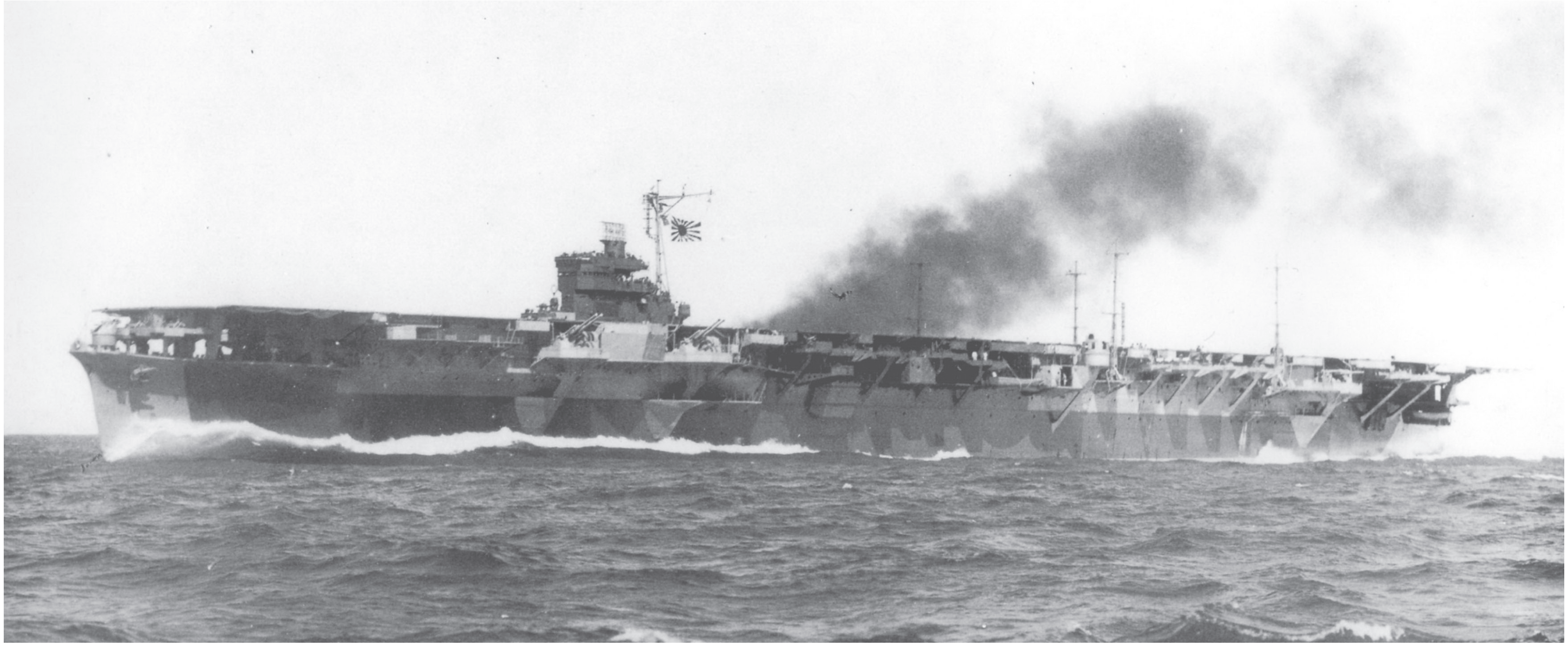
Pacific Ocean, November 1941. Japanese ships are heading towards Pearl Harbor. This photograph taken from the superstructure of Zuikaku shows many features that were very similar in *Hiryū*: 12.7cm gun mounts on sponsons fitted with barrel stops, direction-finding loop antenna, chequer plate walkways along the flight deck and even the small aircraft locking eye plates appearing as dark dots on the deck planking. The vessel visible in the background is *Kaga*.
(Wikimedia Commons)

Correct angle of approach was a very important factor when landing on a carrier. In 1932, the Japanese developed a simple but effective method of helping the pilots. The landing-aid light system consisted of two horizontal light arrays fitted on outriggers attached to the side of the ship. The upper aft array was composed of two red lights and its height was changeable, while the lower fore array comprised four green lights and its position was fixed. The line connecting the two arrays created an adjustable angle with the horizontal plane, from 4 to 6 degrees (the varying value of the landing angle was for different aircraft types). The pilot observed the lights during landing approach, and if he saw them forming a straight horizontal line this meant he was on the correct path. The system could be used either during day or night, with proper light output power. *Hiryū* had two such sets fitted: one on the port side aft (for normal landing procedure) and the other the starboard side fore (for emergency landings from the bow direction).

In earlier Japanese carriers, loading of aircraft onto the ship was carried out by means of overhead cranes under the rear portion of the flight deck which would carry the aircraft to the large sliding door in the aft edge of the lower hangar deck. However, it was decided to discontinue this practice after the Fourth Fleet Incident, when it was proved that the opening in the lower hangar created a serious flooding hazard. Consequently, this solution was removed from *Hiryū*'s design and another way of aircraft loading was introduced. The ship was instead equipped with a collapsible 4-ton crane whose base was placed in a recess of the flight deck, frame 203, on the starboard side. An aircraft was hoisted to the flight deck, from where it was taken to the hangar by one of the elevators. The crane was equipped with two electric drives placed below-decks. The training drive (10hp) had a capability of turning the crane by 180 degrees per minute. The speed of the hoisting drive (30hp) was around 14–18 metres per minute. It took between two-and-a-half and three minutes to raise the crane from its recess and rig it.

In the 1930s, several nations began researching catapult-assisted take-off from an aircraft carrier. If implemented successfully, this would not only shorten the take-off run for modern heavy attack aircraft, but

Waters off Cape Sata (Kagoshima Prefecture, Kyūshū), October 1944. The aircraft carrier *Katsuragi* is steaming at high speed during trials. She was the third member of the Unryū class, whose design, despite obvious external differences, was largely based on *Hiryū*'s. By late 1944, the Imperial Japanese Navy had started using disruptive camouflage on its ships, consisting of green and grey blocks. (Wikimedia Commons)

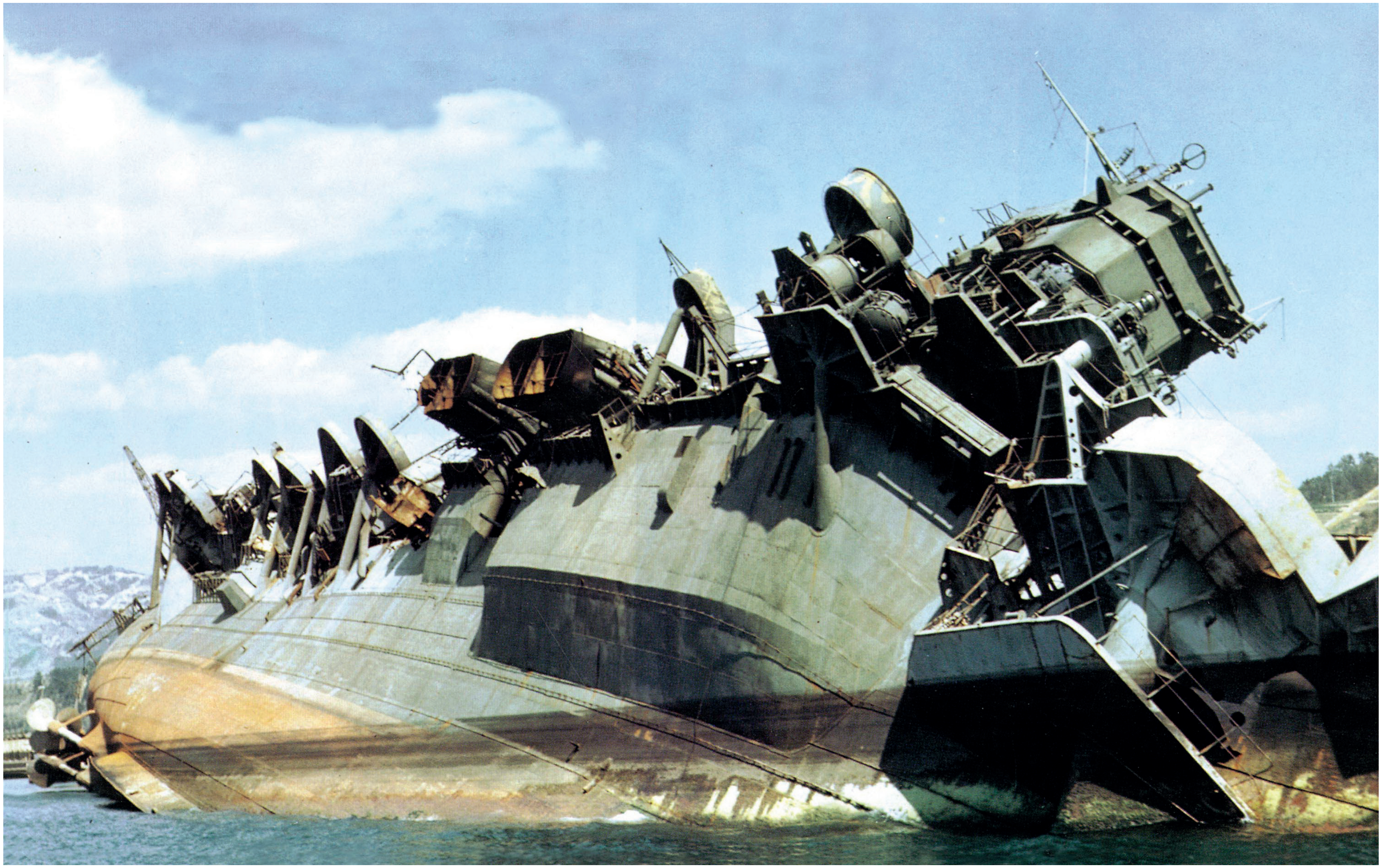


would also decrease the time needed to put the whole air group in the air. The Imperial Japanese Navy was among the navies to conduct tests in this field. Two catapult wells and additional supports were installed in the fore portion of the carrier *Kaga*'s flight deck. However, no successful results were obtained and the project was abandoned. Thus, *Hiryū* never received any catapult installation.

AIRCRAFT

The main offensive weapon of any aircraft carrier is her air group. *Hiryū* was designed to take as many planes as could possibly be fitted inside a vessel of her size. Initially, it was planned to have a total of 73 aircraft in her hangars, including 54 operational planes and 16 spares (stowed in parts). The air group was to consist of the following:

- 12 Mitsubishi A5M4 fighters, plus four in reserve;
- 27 Aichi D1A dive bombers, plus nine in reserve;



Kure harbour, August 1946. Taken post-war, this photograph depicts *Amagi*, another member of the Unryū class, heavily damaged and capsized following American air raids in late July 1945. In contrast with *Hiryū*, her superstructure is placed on the starboard side and in front of the funnels. Other differences included reinforcement of anti-aircraft armament and (not visible here) removal of the middle aircraft elevator. (Wikimedia Commons)

- nine Nakajima B5N torpedo bombers, plus three in reserve;
- nine Nakajima C3N reconnaissance aircraft (this type would never enter serial production).

However, close examination of *Hiryū*'s deck plans in their final form reveals that fitting so many planes inside the hangars would have probably not been possible. When commissioned, the carrier most likely had 54 operational aircraft on board with 12 spares, for a total of 66 aircraft:

- 12 Mitsubishi A5M4 fighters, plus four in reserve;
- 27 Aichi D1A dive bombers, plus eight in reserve;
- 15 Nakajima B5N torpedo bombers.

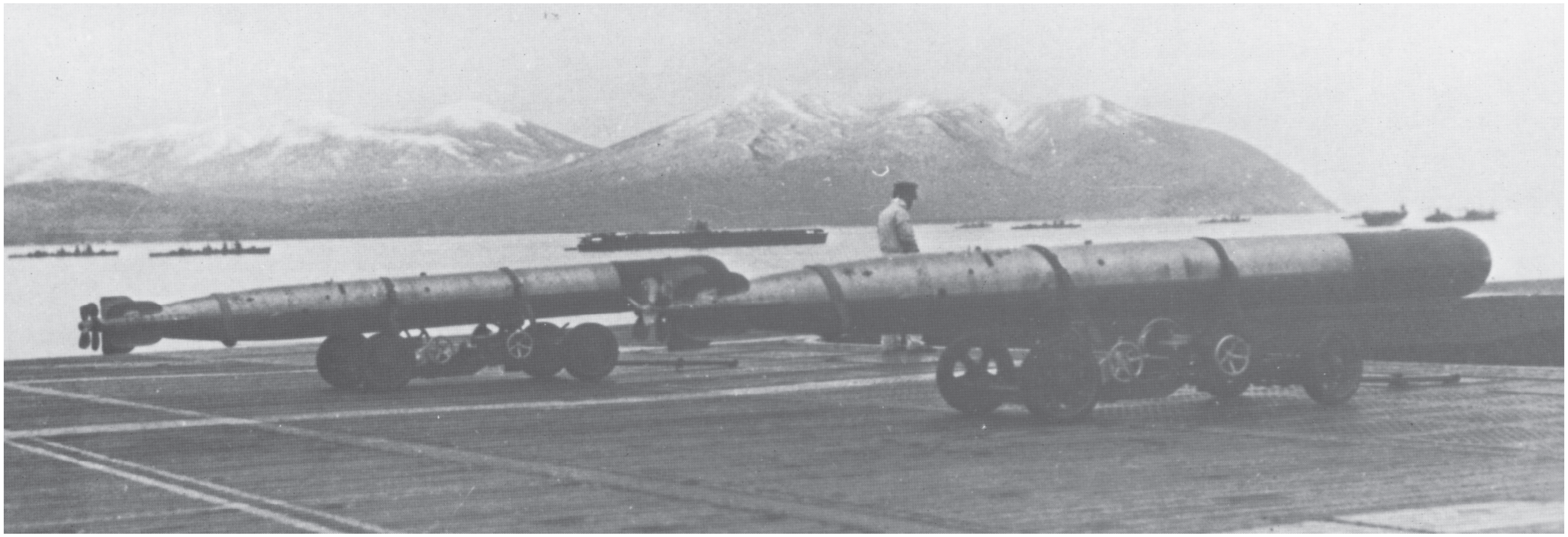
Before the outbreak of the Pacific War, new modern aircraft were developed in Japan. The Mitsubishi A6M2 replaced the A5M, while the Aichi D3A replaced the D1A in fleet carriers. Both newer types were significantly larger than their predecessors, even with their wingtips folded, so a reduction in air group was inevitable. At Pearl Harbor, *Hiryū* carried a total of 63 aircraft (54 operational and nine spares). The available space was divided equally between fighters, dive bombers and torpedo bombers:

- 18 Mitsubishi A6M2 fighters, plus three in reserve;
- 18 Aichi D3A dive bombers, plus three in reserve;
- 18 Nakajima B5N torpedo bombers, plus three in reserve.

By the time of the battle of Midway, spare aircraft were no longer on *Hiryū*. This was due to wartime losses, the need to transfer some aircraft to smaller carriers and a slow rate of production. The only planes on board not belonging to the normal air group of 18 fighters, 18 dive bombers and 18 torpedo bombers were the three A6M2 Zeroes of the 6th Air Group (6 Kōkūtai). They were meant to become a part of the Midway garrison after the planned landing on the atoll and were likely transported using deck park, a rare practice in the Imperial Japanese Navy.

Certainly the most famous Japanese aircraft of all time, the Mitsubishi A6M Zero (or Type 0 Carrier Fighter) entered service in 1940. This year was the origin of its name, since the year 2600 (in imperial nomenclature) was often abbreviated to 0. At the start of the Pacific War, the Mitsubishi Zero was arguably the best carrier fighter in the world. Very fast, well-armed, long-ranged and. what is most important, exceptionally manoeuvrable, this aircraft gave the Japanese pilots an advantage over any opponent they could encounter. However, the Zero's impressive performance was achieved at the price of its light construction, lack of any protection for the pilot and lack of self-sealing fuel tanks.

Hitokappu Bay (Etorofu, Kuril Islands), November 1941. The Japanese strike force is assembling for attack on Pearl Harbor. *Hiryū*'s silhouette can be seen in the centre. In the foreground, two Type 91 Mod. 2 torpedoes are held in their transport trolleys on the flight deck of *Akagi*. Note that the torpedoes don't have their wooden fins fitted, a feature specially developed for attacking in shallow waters like that of Pearl Harbor. (© Lars Ahlberg 2021)



Specifications of the Mitsubishi A6M2b

Crew	1
Wingspan	12m
Length (overall)	9.06m
Height	3.05m
Power plant	Nakajima NK1C Sakae 12 (14 cylinders, 940hp)
Maximum speed	533km/h @ 4,550m
Cruise speed	296–333km/h
Ceiling	10,300m
Time to altitude	7min 27sec to 6,000m
Range	2,200–3,350km
Empty weight	1,754kg
Take-off weight	2,421kg
Armament	2 x 7.7mm Type 97 machine gun in the engine cowling 2 x 20mm Type 91 cannon in the wings 2 x 60kg bomb

Specifications of the Aichi D3A1

Crew	2
Wingspan	14.365m
Length (overall)	10.185m
Height	3.847m
Power plant	Mitsubishi Kinsei 43 (14 cylinders, 990hp) or Mitsubishi Kinsei 44 (14 cylinders, 1,080hp)
Maximum speed	382km/h @ 2,320m
Cruise speed	287m/h
Ceiling	9,300m
Time to altitude	6min 27sec to 3,000m
Range	1,473km
Empty weight	2,048kg
Take-off weight	3,650kg
Armament	2 x 7.7mm Type 97 machine gun in the fuselage above the engine 1 x 7.7mm Type 92 machine gun in the rear 1 x 250kg bomb 2 x 60kg bomb

These defects became evident in the latter stages of the war, when new superior Allied fighter types came into service. Nevertheless, at the time of the battle of Midway, the Zero was still considered a state-of-the-art weapon.

Specifications of the Nakajima B5N2

Crew	3
Wingspan	15.518m
Length (overall)	10.3m
Height	3.7m
Power plant	Nakajima NK1D Sakae 11 (14 cylinders, 970hp)
Maximum speed	378km/h @ 3,600m
Cruise speed	259km/h
Ceiling	8,260m
Time to altitude	7min 40sec to 3,000m
Range	1,281–2,280km
Empty weight	2,279kg
Take-off weight	4,130kg
Armament	1 x 7.7mm Type 92 machine gun in the rear 1 x 800kg Type 91 torpedo or 1 x 800kg bomb or 2 x 250kg bomb or 6 x 60kg bomb or 6 x 30kg bomb

The Aichi D3A, also called the Type 99 Carrier Bomber, was the standard Japanese dive bomber in the first half of the Pacific War. Its Allied codename was Val. The design, particularly the airframe, was heavily influenced by the German Heinkel He-70 fast transport aircraft. Characteristic features of the D3A were its fixed undercarriage and dorsal fin-strake (introduced for improved directional stability). The Val proved to be an extremely effective weapon in the opening months of the war, with huge numbers of Allied ships falling victim to dive bombing. The aircraft was so manoeuvrable that it was sometimes actually used in a fighter role. The weaknesses of the D3A were starting to show by the time of the battle of Midway, but its planned replacement – the Yokosuka D4Y Suisei (Judy) – was not in series production yet. Only one or two prototype Judys were carried by *Sōryū* during her last battle.

At the outbreak of the war, all Japanese fleet flattops were carrying the Nakajima B5N aircraft, which received the Allied codename Kate. Its official name was Type 97 Carrier Attack Aircraft, and it could be used in multiple roles: as a torpedo bomber, horizontal bomber and reconnaissance aircraft. It boasted impressive performance, unparalleled by any other torpedo bomber in the world at the time of its introduction. The B5N was capable of carrying either a Type 91 torpedo, an 800kg armour-piercing bomb or several smaller bombs. Although the Kate was the largest of the aircraft carried by *Hiryū*, it took up a comparatively smaller hangar area due to its smart wing-folding system. Zeroes and Vals, on the other hand, only had foldable wingtips. By 1942, the design of the B5N was five years old and it was understood that a replacement was needed. But the Kate's successor, the Nakajima B6N Tenzan, was not ready to be put into service that year.

ARTILLERY

Arming the hulls of the carriers *Akagi* and *Kaga* with low-angle guns turned out to be a mistake. An aircraft carrier could never be well suited for surface combat, and 20cm artillery mounts with their magazines added a lot of unnecessary weight. Once the Japanese realized that, it was decided to arm subsequent carriers only with anti-aircraft guns. Escort battleships and cruisers, as well as their own aircraft, were supposed to give adequate protection against enemy surface forces. Ultimately, *Hiryū*'s design featured anti-aircraft artillery of two types.

HEAVY ANTI-AIRCRAFT ARTILLERY

In the late 1920s, as aircraft performance rapidly improved, the need to develop an effective medium-calibre anti-aircraft gun emerged. The Imperial Japanese Navy realized this and designed a new weapon in the second half of 1928. Its official name was Type 89 12.7cm 40-calibre high-angle gun. The number 89 referred to the year 1929, although development wasn't actually completed until 1931. Production at Kure Navy Arsenal began in 1932.

Derived from the earlier 10th Year Type 45-calibre 12cm gun, the Type 89 featured a horizontal sliding breech. The twin mount was equipped with moving loaders' platforms designed in such a way that the loaders would always remain in a comfortable position independent of the guns' elevation. This feature, along with high train and elevation speeds, allowed a high rate of fire.

By the start of the Pacific War, most first-line vessels of the Imperial Japanese Navy were armed with Type 89 guns. Combat experience showed that the design suffered from poor muzzle velocity and a consequent insufficient range. Nevertheless, the Type 89 was considered a reliable and successful weapon.

Six twin 12.7cm mounts were fitted on *Hiryū*. They were placed symmetrically, four mounts on fore sponsons and two on aft sponsons. They were all of the A1 type, except for mount no. 5 (starboard aft). This particular mount featured a gas-tight shield for protection against smoke and heat from the funnels. Its designation was A1 Kai 2 (A1 Mod 2). One disadvantage of the chosen placement of 12.7cm mounts on *Hiryū* was that they were positioned too low to be able to shoot across the flight deck. This in turn made it impossible to concentrate fire on one engaged side of the ship.

Ammunition for the guns was provided by four hoists, each of them transporting shells from the magazines at the ship's bottom to ammunition handling stations located near the guns. A 12.7cm practice loading machine was provided for the sailors to work on their loading

Type 89 12.7cm 40-calibre high-angle guns	
Gun weight	3,100kg
Gun length	5.284m
Number of grooves	36
Chamber volume	9dm^3
Rate of fire per barrel	8–14 rounds per minute
Barrel life	800–1,500 rounds
Weight of projectile	23.45kg
Weight of bursting charge	1.88kg
Length of projectile	43.7cm
Weight of complete round	34.32kg
Weight of propellant charge	4kg
Length of complete round	97.1cm
Working pressure	2,500–2,530kg/cm^2
Muzzle velocity	720–725m/s
Range	At 45° elevation: 14,800m At 75° elevation: 9,400m
Weight of mount	A1: 20,300kg A1 Mod 2: 24,500kg
Elevation	-8/+90°
Elevation rate	12°/s
Train	360°
Train rate	6–7°/s
Distance between gun axes	67cm

skills. This was placed on the aft end of the stern boat platform, and most probably was removed shortly before the start of the war.

LIGHT ANTI-AIRCRAFT ARTILLERY

Close-range anti-aircraft defence was provided by the numerous Type 96 25mm guns. The design of this weapon, dating back to 1930, was based on the French-produced Hotchkiss guns. Development was completed by 1935, but an improvement in the form of new flash guards (supplied by Rheinmetall from Germany) followed soon after. The gun formally entered service in mid-1936.

Type 96 guns were fitted in twin and later triple mounts. *Hiryū* became the first Japanese carrier to receive triple mounts. Usually only one gun of a multiple mount was firing at a time, while the others were having their magazines replaced. To help aiming, every fifth round in the magazine was a tracer.

Although considered a weapon with superb performance by the Japanese, the 25mm gun did not achieve the desired results in combat. It used small 15-round magazines that required frequent changes, which greatly affected the rate of fire. The gun also did not have sufficient effective range and its shells were too light to successfully engage World War II-era American aircraft. As a result, Japanese ships were left with inadequate close-in anti-aircraft defence.

Hiryū's 25mm battery totalled 31 guns. The mounts were divided into the following five groups:

- forecastle platform (two twin mounts);
- starboard fore sponson (two triple mounts);
- starboard aft sponson (three twin mounts equipped with anti-smoke shields);
- port fore sponson (two triple mounts);
- port aft sponson (three triple mounts).

During the Pacific War, many Japanese ships had their 25mm batteries strengthened. However, *Hiryū* retained her original anti-aircraft suite as she was lost quite early in the conflict.

Type 96 25mm machine guns	
Gun weight	115kg
Gun length	2.296m
Number of grooves	12
Rate of fire per barrel	220 rounds per minute theoretical 120 rounds per minute practical
Barrel life	About 12,000 rounds
Weight of projectile	Common type: 0.24kg
Weight of bursting charge	Common type: 0.01kg
Length of projectile	Common type: 11.2cm
Weight of complete round	0.68kg
Weight of propellant charge	0.11kg
Length of complete round	24cm
Working pressure	2,700kg/cm^2
Muzzle velocity	900m/s
Range	At 45° elevation: 6,800m At 85° elevation: 3,000m
Weight of mount	Twin mount: 1,100kg Triple mount: 1,800kg
Elevation	-10/+85°
Elevation rate	twin mount: manual triple mount: 12°/s
Train	360°
Train rate	twin mount: manual triple mount: 18°/s

FIRE CONTROL

Two separate fire control systems were fitted in *Hiryū*, each dedicated to directing guns of one calibre.

12.7CM GUNS FIRE CONTROL

Medium-calibre guns were controlled by the Type 94 fire control system. As indicated by its designation, it was developed in 1934. Produced by Nippon Optical, it was derived from British equipment purchased from Vickers.

In contrast with its predecessor, Type 91, Type 94 integrated the 4.5-metre high-angle stereoscopic rangefinder and the director within one cupola. This simplified its operation and ensured that both pieces of equipment were always on the same target. The director was fully tachymetric, meaning that the target's course and speed were calculated directly from data fed by the operators. This task was performed by the below-decks mechanical computer. The rangefinder was equipped with a cross-levelling mechanism. The director was trained by a hydraulic drive. There were ten crewmembers required inside the cupola for the operation of the director.

Performance of the director proved to be satisfactory. Post-war American observers considered the Type 94 comparable to the superb US-produced Mk-37 director. The most important difference was that the former system was never equipped with radar and had to rely on input data from optical observations.

Series production of the Type 94 began in 1937. The first ship to receive the system was *Sōryū* in 1938. *Hiryū* was equipped with two Type 94 directors, both positioned on the port side and serving three 12.7cm mounts each. The starboard side battery was controlled by the director on top of the superstructure (frame 126.5), and the port side battery by the director on a port side sponson (frame 111).

25MM GUNS FIRE CONTROL

Hiryū's automatic weapons were controlled by the Type 95 directors. The central part of this equipment was the French-developed Le Prieur sight which helped estimate a target's course, speed and range. As a backup, the same sight was also fitted to each of the 25mm mounts. The director had the advantage of being distant from the vibration, smoke and noise when the guns opened fire.

The Type 95 was operated by three crewmembers: a commander, pointer and messenger. Performance of the director in combat conditions turned out to be much below expectations, with crews complaining that it was too complicated and aiming was difficult. This contributed to the low efficiency of Japanese automatic guns in the Pacific War.

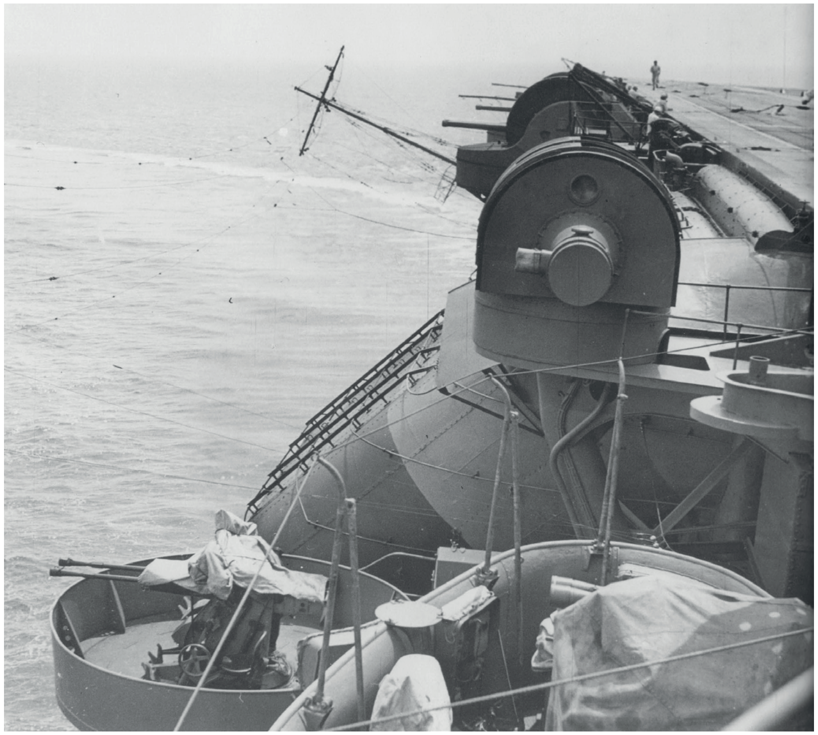
Five Type 95 directors were fitted on *Hiryū*, each controlling two or three multiple 25mm mounts nearby. The locations were the following: forecastle platform, starboard fore sponson, starboard aft sponson, port fore sponson and port aft sponson. The two directors on the forecastle and the starboard aft sponson were shielded versions. In the case of the former, the protection was against water and spray, while the latter needed to be shielded from the funnels' smoke and heat.

BOATS

Similarly to earlier Japanese carriers, *Hiryū* carried a large set of boats of various types. With only two exceptions, all were stowed on the stern under the overhang of the flight deck. A pair of overhead cranes was provided to hoist them. The carrier's 11-boat outfit consisted of the following:

- Two 13m special type transportation boats stowed on the stern, upper deck level (engine output 60hp, maximum speed 8 knots, capacity 150 men). Their huge size and built-in landing ramps in the bows made them suitable for transport of supplies and men to beaches.
- Three 12m motor boats stowed on the stern, top deck level (engine output 80hp, maximum speed 10.5 knots, capacity 35 men).

Aircraft carrier *Kaga* conducting practice landings, 11 May 1937, starboard side looking aft. Some elements are very similar to what would be found in *Hiryū*: twin 25mm gun mount (bottom left), downward-bent riveted funnel (centre), tilted wire antenna mast and shielded 12.7cm gun mount (top). The dome seen in the centre is a rangefinder for direction of the ship's 20cm guns, a feature not present in later carriers. (Wikimedia Commons)



Fast and comfortable, these boats were used for transporting officers between ships and other harbour duties.

- Two 12m motor launches stowed on the stern, upper deck level (engine output 30hp, maximum speed 7 knots, capacity 110 men). These vessels usually transported men and supplies between the ship and the mainland.
- Two 9m row cutters hung in davits on amidships sponsons on both sides (capacity 45 men, six rowers per side). These were the only boats stowed outside the stern area. They were primarily used for emergencies, but also for regular men and cargo transport duty. The cutters were kept in a ready-to-launch condition at all times, and were equipped with basic supplies for survival at sea.
- One 8m motor launch stowed on the stern, top deck level (engine output 10hp, maximum speed 5 knots, capacity 30 men). This was a smaller variant of the 12m motor launch.
- One 6m row sampan stowed on the stern, top deck level (capacity 30 men). This boat was small and easy to manoeuvre. Its shallow draft (0.6m) made it suitable for all kinds of harbour work.

OTHER EQUIPMENT

By the time of the battle of Midway, Japanese work on shipborne radar was well advanced. However, most probably none of the carriers participating in the operation received any radar equipment before their last deployment. Some of *Hiryū*'s officers testified during their post-war interrogations that their ship was indeed equipped with radar, but this stands in contrast with all other evidence, including the photos taken at the battle of Midway.

For illumination at night, *Hiryū* was equipped with four powerful 110cm searchlights. In order to save space, they were placed in flight deck wells, frames 85 and 197. When a need to use a searchlight arose, the circular rotating steel cover above the well would be opened and the searchlight elevated to the flight deck level by an electric motor. Each of the searchlights had its dedicated Type 94 director. The directors were placed on front and aft platforms of the superstructure, one deck above the flight deck level.

Like almost every larger vessel of the Imperial Japanese Navy, *Hiryū* was fitted with minesweeping equipment – paravanes. Their purpose was to drag and cut mines' anchor cables. They were stowed on upper deck sponsons on both sides of the ship and were operated by the means of small derricks.

Another anti-mine measure was the degaussing cable, which consisted of a group of wires running around the hull outer plating above the waterline. When appropriate current was switched on, the effect was that the ship's natural magnetic field was neutralized. This caused the fuses of magnetic mines to malfunction. The degaussing cable was added shortly before the Pacific War, most probably during *Hiryū*'s docking time in August 1941.

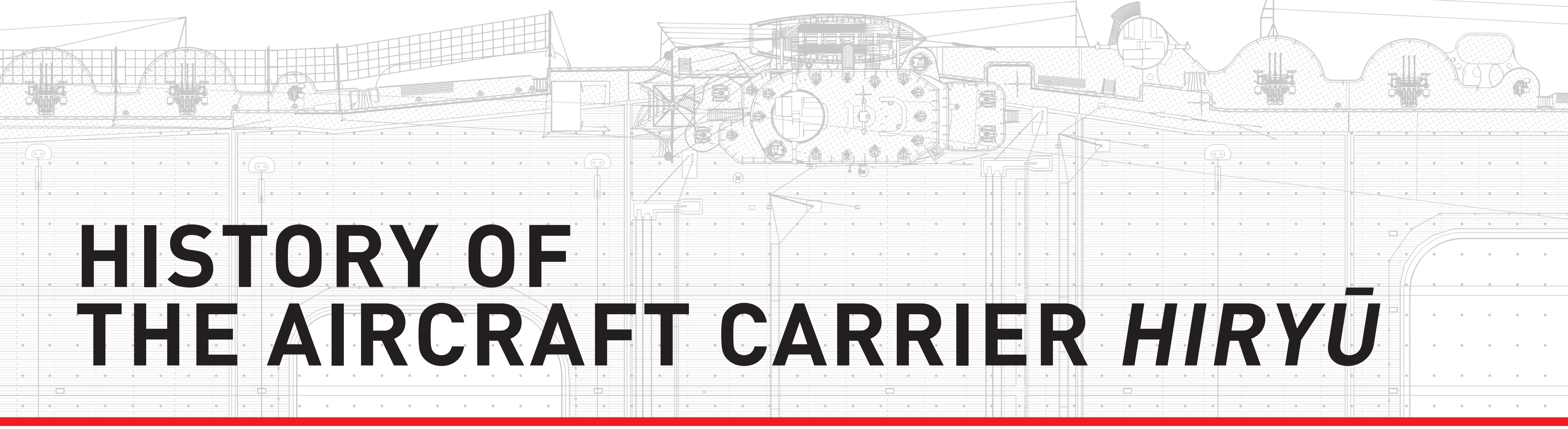
Since the Japanese always put a great stress on night-time combat in their training, optical detection equipment was numerous on all their ships. *Hiryū*'s lookout binoculars (both high-angle and low-angle) were grouped on the superstructure and special lookout platforms amidships. Some of the binocular mounts included infra-red signalling equipment.

For wireless communication, *Hiryū* had four masts with wire antennas stretched between each pair on either side of the flight deck. The masts were collapsible and could be lowered when flight operations were in progress. Some additional wire antennas were stretched between outriggers attached to the superstructure and anti-aircraft gun sponsons. Four direction-finding loop antennas were also present for tracking the enemy's wireless transmissions.

In contrast with contemporary Japanese heavy cruisers, *Hiryū* had no hydrophones fitted in her hull. This feature was present in the Shōkaku class and subsequent carriers.

COMPLEMENT

Hiryū's complement was somewhat larger than *Sōryū*'s. According to documents from 1941, the number of crewmembers at that time totalled 1,330. This figure included 54 officers, 25 special-service officers, 36 warrant officers, 330 petty officers and 885 seamen.



HISTORY OF THE AIRCRAFT CARRIER *HIRYŪ*

8 July 1936: The ship was laid down at Yokosuka Navy Arsenal.

16 November 1937: The launching ceremony took place.

1 April 1939: Captain Ryūzō Takenaka assumed command of the ship. His first duty was to supervise the fitting-out of the vessel. This process was not completed until June.

Late April 1939: First open-sea machinery trials were conducted off Tateyama (Bōsō Peninsula, Honshū).

Late June 1939: Post-completion trials off Tateyama. The carrier reached a speed of 34.59 knots.

5 July 1939: Commissioning day. *Hiryū* was officially placed in active service.

July–October 1939: Intense crew training in home waters. Preparations for combat deployment were made.

15 November 1939: Captain Ichihei Yokokawa relieved Captain Takenaka as the commanding officer. *Hiryū*, along with her half-sister *Sōryū*, was assigned to the Second Carrier Division (第二航空戦隊, Dai ni kōkū sentai), Second Fleet. *Sōryū* became the flagship of the division.

December 1939–March 1940: Both carriers conducted joint exercises in Japanese territorial waters.

26 March 1940: The Second Carrier Division was given the order to sail to the South China Sea, where they were intended to give support to Japanese land forces in China. *Hiryū* and *Sōryū* dropped anchor at Kirun, Formosa (Japanese-occupied Taiwan).

1 May 1940: Having completed her Chinese deployment, *Hiryū* returned to Sasebo and was dry-docked in the following weeks.

Late June 1940: The carrier moved to Yokosuka base.

5–22 July 1940: The Second Carrier Division performed training in the waters off Tateyama.

August 1940: The two carriers steamed to several locations along the Japanese coast, including Hakodate (Hokkaidō), Ise Bay (Honshū), Saiki Bay and Beppu (Kyūshū), and Sukumo Bay (Shikoku).

9 September 1940: *Hiryū* arrived at Kure for a brief stay.

15–17 September 1940: Moored at Yokosuka, the carrier picked up *Sōryū*'s aircraft. Sōryū was being dry-docked at the time.

Late September 1940: *Hiryū* delivered the aircraft to Hainan Island, where they supported the Japanese invasion of French Indochina.

11 October 1940: Along with many other vessels of the Imperial Japanese Navy, the carrier took part in a naval review at Yokohama Bay.

15 November 1940: Captain Shikazō Yano assumed command of the ship. Around the same time, Rear Admiral Tamon Yamaguchi was assigned to command the Second Carrier Division. He would stay in this position until his death and the destruction of the division during the battle of Midway.

21 January 1941: After a short stay in Saiki Bay, *Hiryū* returned to Kure.

26 January 1941: The carrier moved to nearby Iwakuni.

1 February 1941: The Second Carrier Division headed towards Formosa. On the way, *Sōryū* collided with the destroyer *Yūzuki* and had to turn back to Sasebo for minor repairs.

5 February 1941: *Hiryū* arrived at Takao, Formosa (present-day Kaohsiung) and waited for her half-sister there.

22 February 1941: Both ships of the Second Carrier Division left harbour and operated between Formosa and Okinawa. Their task was to support the naval blockade of China.

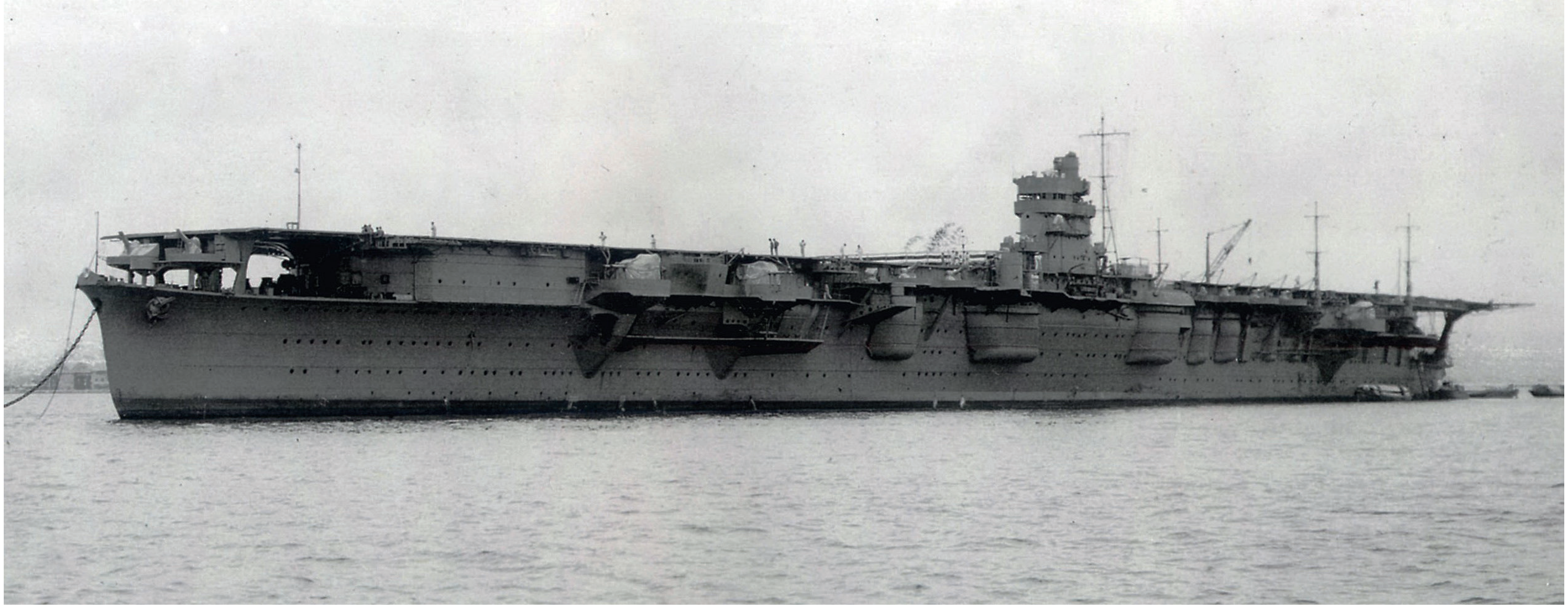
24 February 1941: The carriers anchored at Nakagusuku Bay (Okinawa) to refuel, and promptly resumed their actions.

3–7 March 1941: The task force stayed at Takao.

12 March 1941: *Hiryū* dropped anchor in the Ariake Sea (Kyūshū).

25 March 1941: The carrier arrived at Sasebo.

Yokosuka Naval Arsenal, 5 July 1939. On this day, *Hiryū* was commissioned. To the left of the bridge, a ceremonial structure can be seen on the flight deck, along with decorative trees. Several of the ship's boats are near the stern. Shipyard and Navy officials have come on board through the port-side aft accommodation ladder. Interestingly, the 4-ton aircraft crane is rigged in this photograph. (Wikimedia Commons)



29 March 1941: The ship entered dry dock for minor repairs.

10 April 1941: Having gathered valuable combat experience in the waters off China, the Japanese made a wise decision to combine all their carriers in a single task force. This was named the First Air Fleet (第一航空艦隊, Daiichi kōkū kantai), but more commonly called the Mobile Fleet (機動部隊, Kidō Butai). Its core consisted of three carrier divisions: the First Carrier Division (*Akagi*, *Kaga*), Second Carrier Division (*Sōryū*, *Hiryū*) and Fourth Carrier Division (*Ryūjō*). *Ryūjō*'s usefulness was limited and she was usually not included in major operations. The Fifth Carrier Division (*Shōkaku*, *Zuikaku*) would be added to the force later in the year, creating the largest concentration of naval air power the world had seen until that time.

26 April 1941: Having departed Sasebo, *Hiryū* steamed to Hosojima (Hiroshima Prefecture), where she conducted training of her pilots using the nearby Tomitaka Air Base.

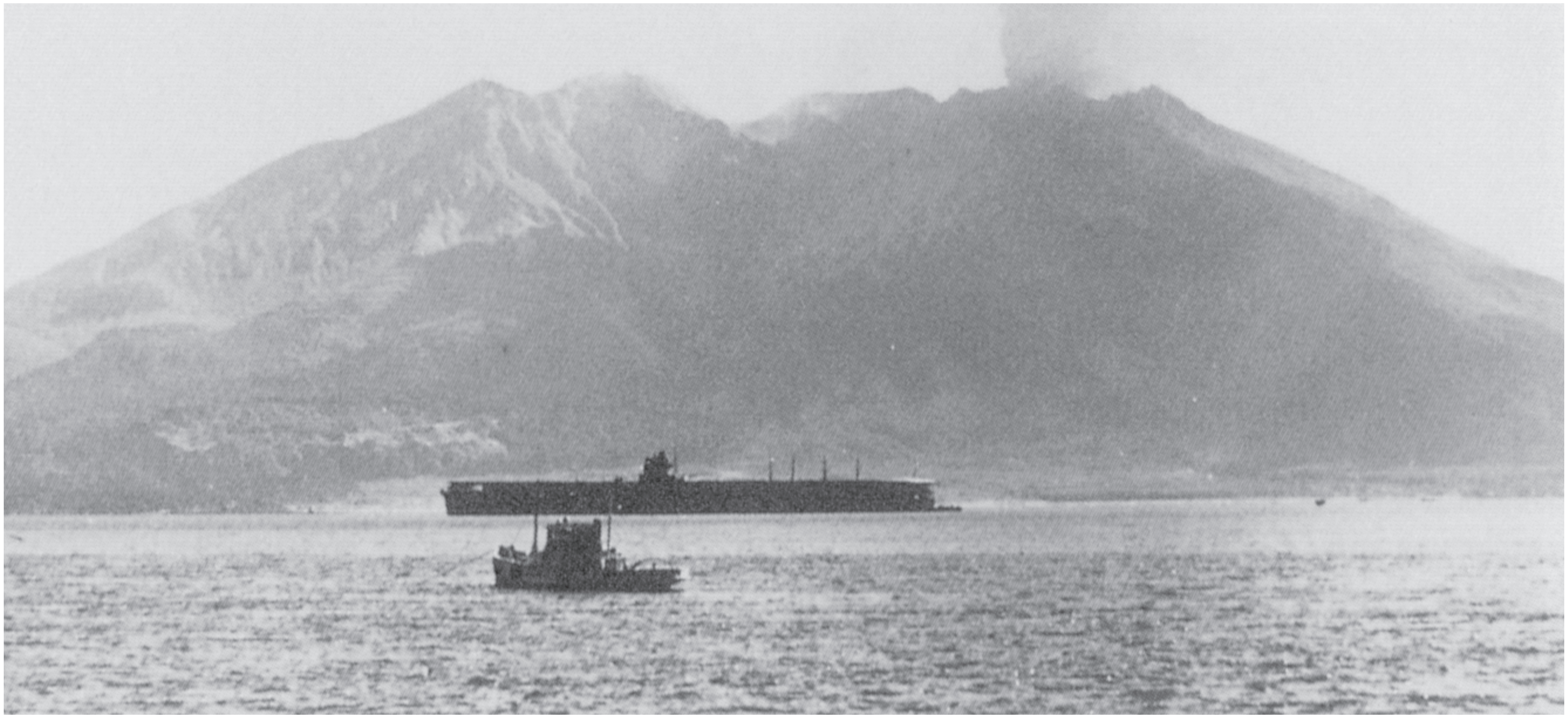
20 May 1941: *Sōryū* joined her half-sister to perform exercises.

30 May 1941: The carrier dropped anchor at Beppu (Kyūshū) and picked up aircraft from an air base in the vicinity.

30 June 1941: The Second Carrier Division moored at Yokosuka.

10 July 1941: Both carriers left harbour and headed south. The orders were to give further support to Operation *FU* (the invasion of southern French Indochina).

14 July 1941: *Hiryū* and *Sōryū* refuelled at Macau, China.



Kagoshima Bay, Kyūshū, October 1941. This month was very busy for the crews of the Second Carrier Division, who conducted intensive training for the upcoming raid on Pearl Harbor. *Hiryū* can be seen anchored off the mountainous coastline during a break from the exercises.
(© Lars Ahlberg 2021)

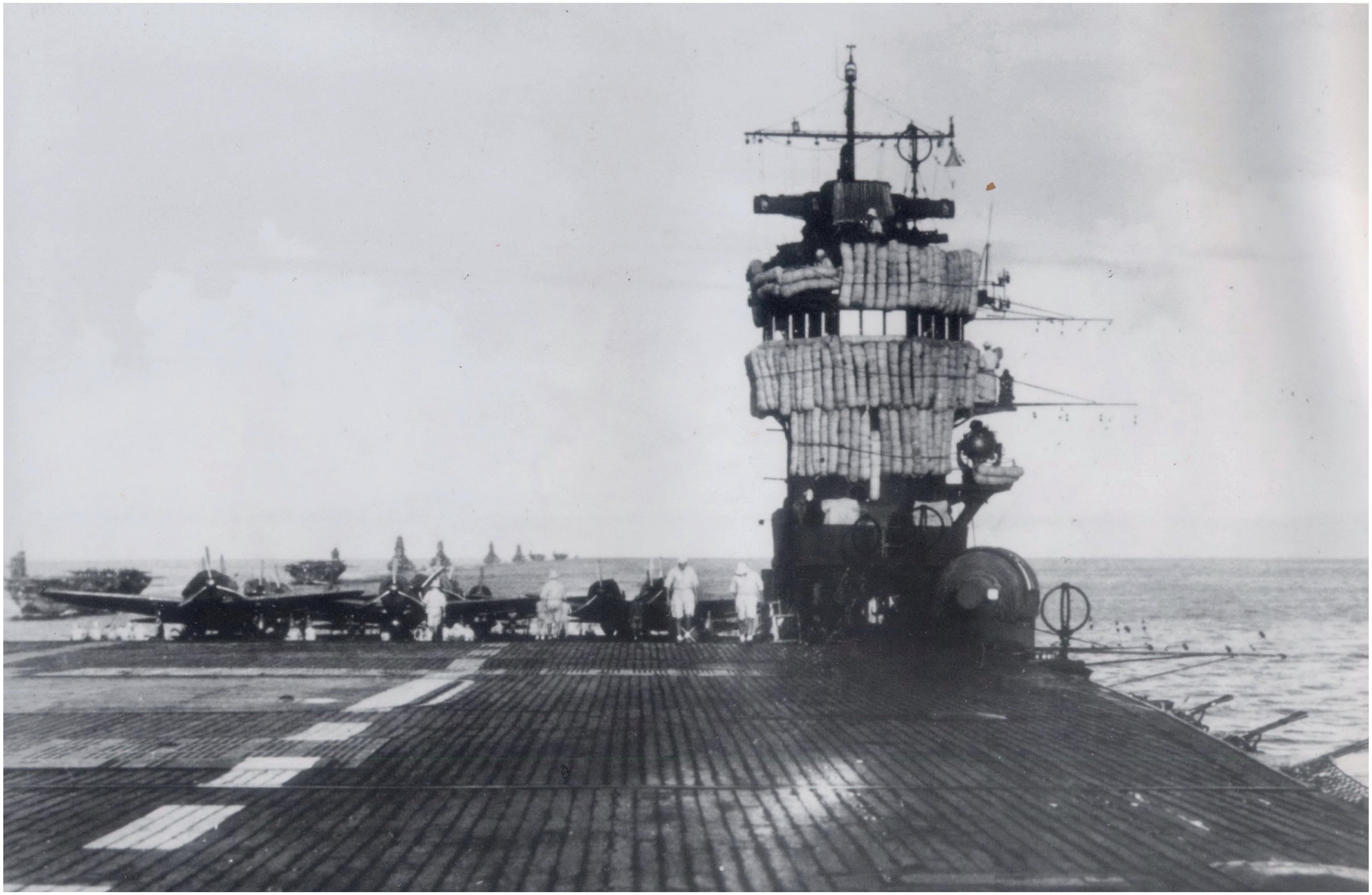
16 July 1941: The carriers arrived at Samah, Hainan Island.

Staring Bay, Celebes, 26 March 1942. Picture taken from the flight deck of *Akagi* on the day of Kidō Butai's departure for Operation *C* – the Indian Ocean Raid. Vice-Admiral Nagumo's flagship is leading the formation, followed by *Sōryū*, *Hiryū*, *Hiei*, *Kirishima*, *Haruna*, *Kongō*, *Zuikaku* and *Shōkaku*. Only *Kaga* is missing, as she was undergoing repairs at Sasebo at the time. In the foreground, some features common to most Japanese carriers are evident: arrester gear, deck expansion joint, crew safety nets, windscreen and aircraft elevator. Another interesting detail is the presence of rolled hammocks on the superstructure's outer surface, a form of additional anti-splinter protection. *Akagi* and *Hiryū* were the only carriers in the Imperial Japanese Navy with port-side superstructures.
(Wikimedia Commons)

25 July 1941: Both ships raised anchor and headed towards the mainland.

29–30 July 1941: *Hiryū* and *Sōryū* stayed at Cape St James (near Saigon) and Grande-Condore Island.

1 August 1941: The carriers returned to Samah. While political tension persisted, the carriers had to be present in the area.



7 August 1941: *Hiryū* arrived at Sasebo and entered dry dock for a thorough overhaul. War against the United States was anticipated, and most ships of the Imperial Japanese Navy received similar treatment.

8 September 1941: Captain Tomeo Kaku relieved Captain Yano as commanding officer of *Hiryū*. In the meantime, Admiral Yamamoto (commander-in-chief of the Combined Fleet) and his staff started planning the fleet's actions in the event of war, which now seemed inevitable. Kidō Butai would be given the task of attacking the US Pacific Fleet base at Pearl Harbor, Oahu Island, Hawaii.

10 September 1941: *Hiryū* left the dry dock.

16 September 1941: The carrier arrived at Izumi (Kyūshū) and continued intensive training of her aircrews. In order to conceal their intentions from the enemy, the Japanese decided that for the time being each of the Kidō Butai's carrier divisions would conduct scheduled exercises separately.

22 September 1941: *Hiryū* temporarily became the flagship of the Second Carrier Division.

October 1941: *Sōryū* and *Hiryū* stayed in the waters off Kagoshima Prefecture (Kyūshū) and performed a series of joint training exercises in preparation for the upcoming top secret operation.

26 October 1941: The flag of the Second Carrier Division's commander was transferred back to *Sōryū*.

1 November 1941: Both carriers joined *Akagi* and *Kaga* in Kagoshima Bay and executed an exercise simulating the attack on Pearl Harbor.

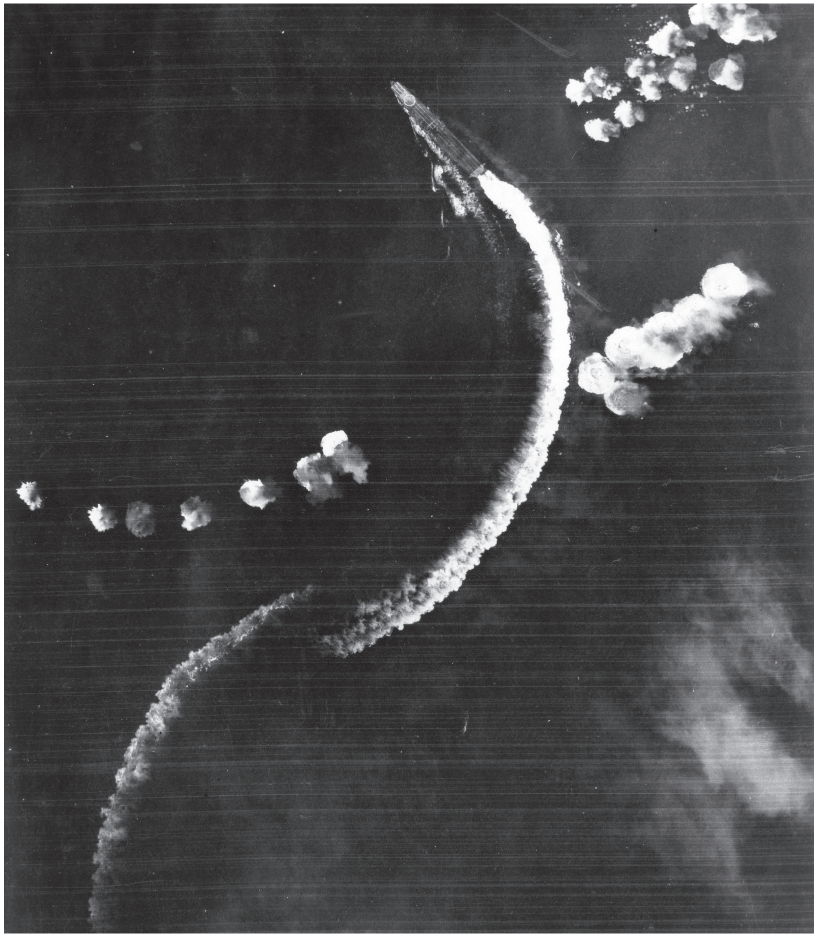
7 November 1941: *Hiryū* arrived at Sasebo, where she was prepared for the upcoming sortie. Heavy oil and avgas tanks were filled and weapons magazines were topped up.

16–17 November 1941: Air groups were loaded onto the decks of *Hiryū* and *Sōryū*.

18 November 1941: The Second Carrier Division departed Kyūshū and headed towards Hitokappu Bay (Etorofu, Kuril Islands). This was the secret assembly point of the Japanese force to attack Pearl Harbor.

22 November 1941: Having sailed some distance from the Japanese coastline to conceal their movement from potential observers, the carriers arrived at Hitokappu.

North-west of Midway, 4 June 1942, around 0800hrs. *Hiryū* is making a series of tight turns at high speed to avoid the bombs dropped by a formation of B-17s. Splashes are visible on both sides of the carrier's wake, but she was not hit during the attack. (National Archives, USAF-3725)

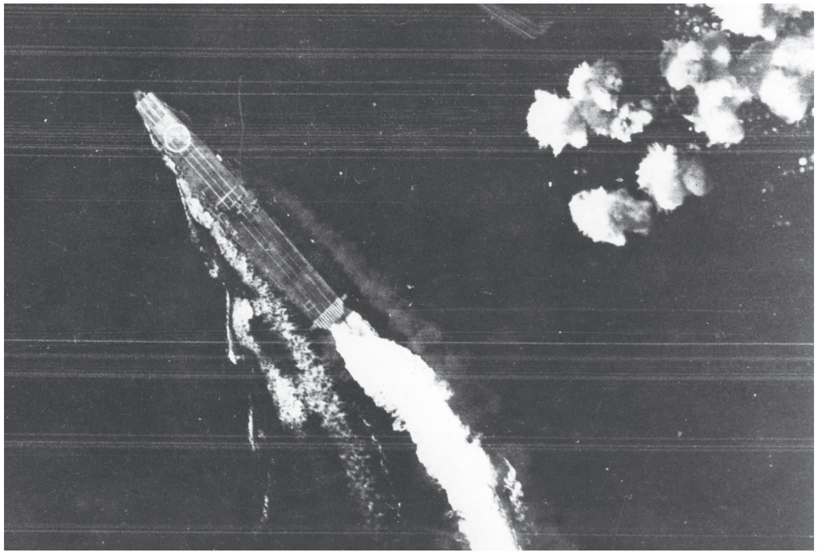


26 November 1941: The ships of the Kidō Butai raised anchor and set course for Hawaii. The force consisted of six aircraft carriers (*Akagi*, *Kaga*, *Sōryū*, *Hiryū*, *Shōkaku* and *Zuikaku*), two battleships (*Hiei* and *Kirishima*), two heavy cruisers (*Tone* and *Chikuma*), a light cruiser (*Abukuma*) and nine destroyers. They were supported by 23 fleet submarines, five midget submarines and eight tankers. Overall command was held by Vice Admiral Chūichi Nagumo.

2 December 1941: Although the Japanese ships were already at sea, negotiations with the United States were still in progress. It was not until this day that the final decision to attack was made. The coded message to Nagumo, saying 'Climb Mount Niitaka 1208', set the date of the operation to 8 December.

7 December 1941, 0600hrs local time (8 December 1941 Tokyo time): The first wave of the Japanese strike began taking off from the six carriers. From a position around 230 miles north-west of Oahu, *Hiryū* launched eight Nakajima B5N2s armed with torpedoes, ten Nakajima B5N2s armed with 800kg armour-piercing bombs and six Mitsubishi A6M2s. Immediately after the take-off, preparations were made to launch the second wave.

North-west of Midway, 4 June 1942, around 0800hrs. Some interesting details are in this enlarged and cropped version of the previous photograph. Two Zero fighters are parked near the superstructure in preparation for take-off. A large red *Hinomaru* (Rising Sun symbol) had been painted on the fore portion of the flight deck shortly before the battle. This practice was not repeated in other carriers in later operations, as the feature seemed to help American dive bomber pilots to take aim. A large katakana HI character, as well as white and red stripes, are also evident near the flight deck's aft edge. (National Archives, USAF-3725)



7 December 1941, 0755hrs: Japanese aircraft arrived above Pearl Harbor. *Hiryū*'s torpedo bombers were assigned to attack US carriers, but unknown to the Japanese, no flattops were present in the base that day. The Nakajima Kates began searching for alternative targets. Four of them attacked the light cruiser USS *Helena* (CL-50) and minelayer USS *Oglala* (CM-4), with no success, while other four aimed their torpedoes at the battleships USS *Oklahoma* (BB-37) and USS *West Virginia* (BB-48), most likely scoring hits. The ten high-level bombers dropped their heavy bombs on various targets within the so-called 'Battleship Row' (two columns of battleships moored alongside Ford Island) and probably scored several hits. The heaviest blow attributed to the pilots from *Hiryū* was the hit on the battleship USS *Arizona* (BB-39), which caused her fore magazines to explode. *Arizona* was completely destroyed and sank within seconds, with a huge death toll. Escort fighters from *Hiryū* strafed Marine Corps Air Station Ewa, destroying a number of aircraft on the ground.

7 December 1941, 0829hrs: Lieutenant Commander Mitsuo Fuchida (commander of the strike) gave the order to return to the carriers. In the meantime, aircraft of the second wave had been launched and were already approaching Oahu. *Hiryū*'s contribution to this strike consisted of 18 Aichi D3A1s and nine Mitsubishi A6M2s, but one dive bomber and one fighter had to abort the mission due to technical malfunctions.

7 December 1941, 0900hrs: The second wave of Japanese aircraft began its strike. *Hiryū*'s fighters strafed several airfields on the island, destroying aircraft on the ground and in the air. Dive bombers attacked various ships damaged by the first wave, most probably taking part in the bombing of battleship USS *Nevada* (BB-36) as she attempted to leave the base.

7 December 1941, 0945hrs: The second wave of the strike turned back to their mother ships. Satisfied with the results of the attack, Nagumo ordered the task force to retreat as soon as all aircraft had been recovered. *Hiryū*'s losses in the operation totalled four Aichi Vals and one Mitsubishi Zero.

16 December 1941: On the way back to Japan, *Hiryū* and *Sōryū* were detached and ordered to support the Japanese assault on Wake Island, which had been unsuccessful so far.

21–22 December 1941: Both carriers launched two bomb strikes on Wake Island. The only two surviving American fighters on the airfield managed to shoot down two Kates from *Sōryū* before being destroyed. All aircraft from *Hiryū* returned to their carrier safely.

23 December 1941: With most of the defences destroyed from the air in the previous days, the Japanese managed to capture the island. The aircraft carriers were ordered to set course for Japan.

29 December 1941: *Hiryū* and *Sōryū* arrived at Kure. Both ships were resupplied and serviced in the next few days.

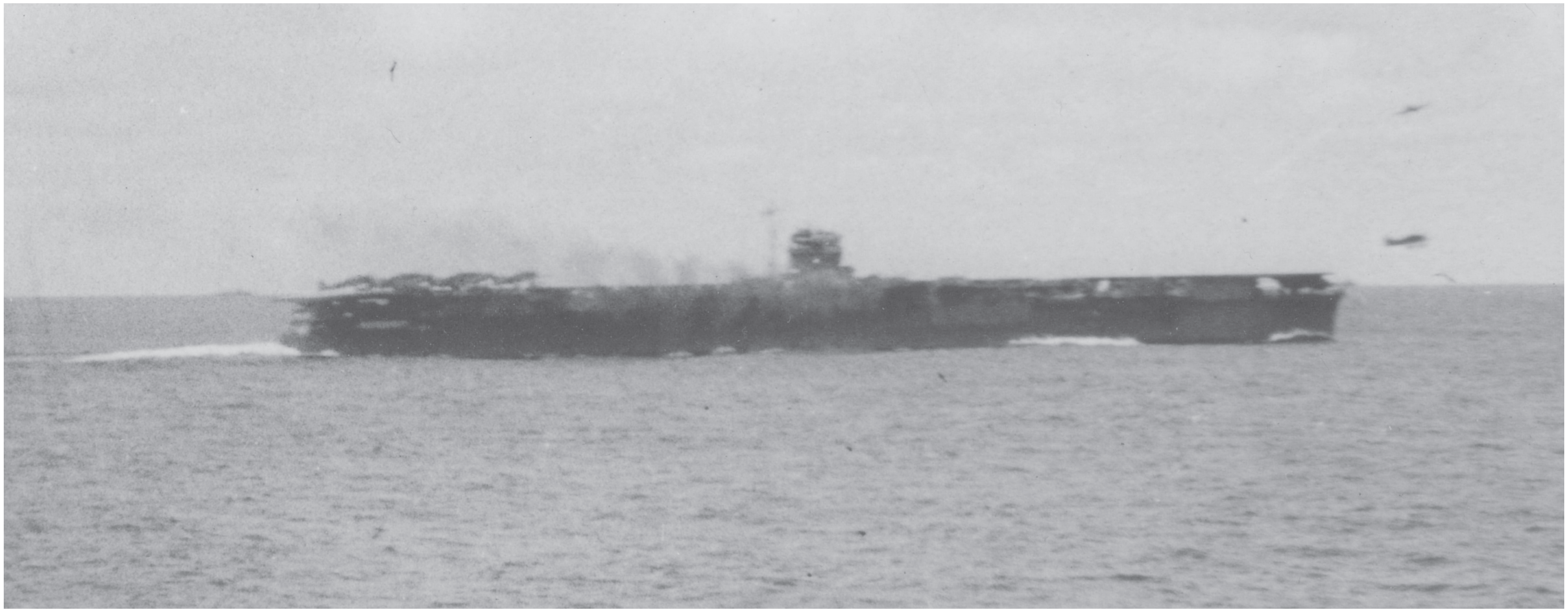
8 January 1942: The Second Carrier Division was assigned to the Southern Force to take part in the fight for the Dutch East Indies.

11 January 1942: The carriers arrived at Hashirajima anchorage near Hiroshima and prepared for the sortie.

12 January 1942: *Hiryū* and *Sōryū* departed the Inland Sea and headed south.

17 January 1942: Both ships arrived at Palau, where they awaited escort battleships, cruisers and destroyers. The force departed on the 21st.

Hiryū during the procedure of launching aircraft. It is unclear when exactly this photograph was taken. Some sources claim it was around 1 June 1942, during take-off of a reconnaissance Nakajima Kate. Others state that it was during the battle of Midway, when *Hiryū* was sending her dive bomber strike against USS *Yorktown* (4 June, around 1100hrs). Apart from the formation of aircraft parked on the flight deck and a single one taking off, one more is circling above the carrier. Two escorting destroyers can be dimly seen next to the bow and to the left of the stern. (© Lars Ahlberg 2021)



23–24 January 1942: The carriers conducted two successful bombings of Ambon (Maluku Islands, Dutch East Indies).

25–27 January 1942: *Hiryū* and *Sōryū* stopped at Davao (Mindanao Island, Philippines) for a brief stay.

28 January 1942: The Second Carrier Division arrived at Palau, the assembly point for the force to conduct an attack on Australia. In the following days the division would be joined by the carriers *Akagi* and *Kaga*, battleships *Hiei* and *Kirishima*, heavy cruisers *Tone* and *Chikuma*, light cruiser *Abukuma* and numerous destroyers.

15 February 1942: The task force departed Palau and set course for the northern Australian coast.

19 February 1942: The four carriers launched a strike on Port Darwin (Australia) from a distance of about 240 miles. The element of surprise was achieved again. Japanese aircraft destroyed several ships, harbour facilities and nearby airfields. One of the few defenders' fighters that managed to take off, a Curtiss P-40 of the USAAF, shot down one of the *Hiryū*'s Zeroes. The pilot survived and was captured by the Australians.

21 February 1942: The Japanese ships arrived at an anchorage in Staring Bay, Celebes. In the following days they would be prepared for another offensive operation.

25 February 1942: The task force departed to take part in the Japanese assault on Java.

1 March 1942: The carriers' task was to attack any enemy vessels located south of Sunda Strait. *Hiryū*'s dive bombers took part in the sinking of two American ships: the destroyer USS *Edsall* (DD-219) and oiler USS *Pecol* (AO-6).

5 March 1942: Another bombing was directed at the harbour of Tjilatjap (southern Java). Japanese aircraft sank or damaged more than ten ships as well as destroying military installations in the area.

7 March 1942: *Hiryū* and *Sōryū* were ordered to launch a strike against Christmas Island (south of Java). Dutch freighter *Poelau Bras* was sunk in the process.

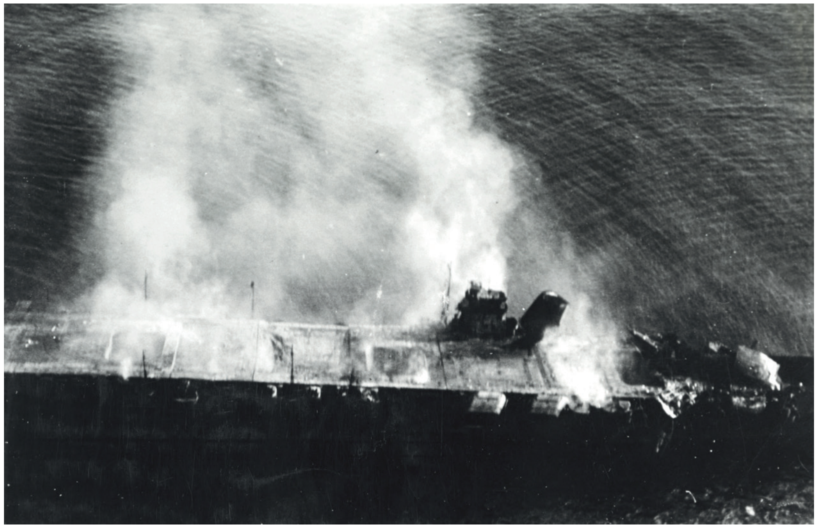
11 March 1942: With no valuable targets remaining around Java, the carriers returned to Staring Bay.

26 March 1942: The five carriers of the Kidō Butai (without *Kaga*, which was undergoing repairs) set out to execute Operation *C* – a sortie that would later be called the Indian Ocean Raid.

4 April 1942: Having entered the Indian Ocean, the Japanese task force was spotted and reported by a reconnaissance Catalina, which was shot down by *Hiryū*'s fighters that were on Combat Air Patrol (CAP) at the time. Meanwhile, in the face of imminent attack, all Allied ships in Colombo (Ceylon) were ordered to put to sea and nearby airfields were alerted to repel the strike.

5 April 1942: In the morning hours, Nagumo ordered his carriers to launch aircraft from a distance of about 120 miles from Colombo. *Hiryū*'s contribution consisted of 18 Nakajima B5N2s and nine escort Mitsubishi A6M2s. On their approach to the target, the carrier's Zeroes came upon six Fairey Swordfish biplanes and shot them all down. The fighters also shot down a number of defending Hawker Hurricanes for the price of slight damage to several Japanese aircraft. The bombers conducted a strike on the harbour and its facilities, but most of the ships had already escaped to the open sea. Above the task force, CAP Zeroes shot down a scouting Catalina and a Fairey Albacore. Meanwhile, Japanese reconnaissance managed to locate British heavy cruisers HMS *Dorsetshire* and HMS *Cornwall* south-east of Ceylon. An immediate strike was ordered, with 18 of *Hiryū*'s Aichi D3A1s participating. The dive bombers achieved unprecedented accuracy in favourable conditions, scoring numerous hits within a short span of time. Both British cruisers sank a few minutes after being bombed.

9 April 1942: Another attack by the Kidō Butai was targeted at Trincomalee harbour (north-eastern Ceylon). *Hiryū*'s 18 Nakajima Kates and six Mitsubishi Zeroes took part in the raid, which resulted



North-west of Midway, morning of 5 June 1942. This photograph was taken by a reconnaissance aircraft launched by the carrier *Hōshō* that was a part of the Main Body, sailing a large distance behind the Kidō Butai. *Hiryū* can be seen burning shortly before she sank. Catastrophic damage has been done to the fore portion of the flight deck by the four bomb hits. The large object in front of the superstructure is a fragment of the no. 1 aircraft elevator thrown to that location by the force of explosions inside the hangar. Wire antenna masts were usually lowered when conducting flight operations, but here they can be seen raised. They were most probably put in this position to avoid hitting the destroyers that came alongside to help fight the fires.
(Naval History & Heritage Command, NH 73064)

in the loss of two bombers. In the meantime, another Catalina was claimed by *Hiryū*'s CAP. Later on, a Japanese scouting aircraft reported a British carrier further south. *Hiryū* launched 18 Aichi Vals and three Mitsubishi Zeroes, but they failed to take part in the attack.
By the time they were above the target, the carrier HMS *Hermes*, along with escorting Australian destroyer HMAS *Vampire*, had already been bombed by aircraft from other Japanese ships. *Hiryū*'s pilots instead turned to deliver a strike on the freighter *Athelstone* and her escort corvette, HMS *Hollyhock*. Both ships were sunk. The British launched a counter-attack on the Japanese carriers. Nine Bristol Blenheims managed to approach the Japanese formation undetected and only narrowly missed Nagumo's flagship, *Akagi*. The CAP immediately reacted and *Hiryū*'s Zeroes took part in destroying most of the bombers, losing one of the carrier's fighters in return. Upon completing its mission, the Kidō Butai turned back towards Japan, taking a route through the Malacca Strait.

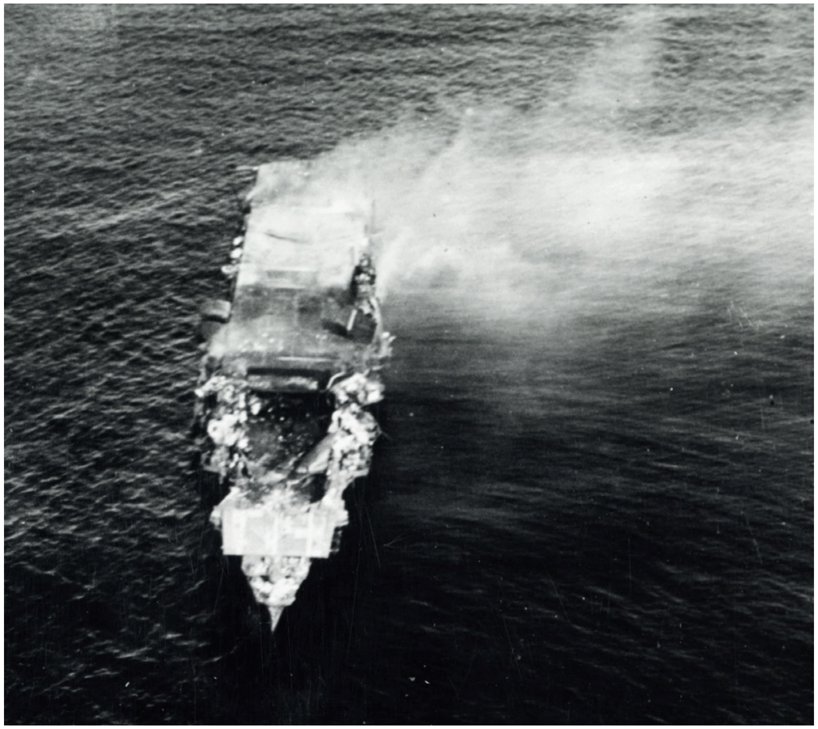
18 April 1942: The Fifth Carrier Division was detached from the force to take part in Operation *MO* (the attempted assault on Port Moresby, New Guinea, which resulted in the battle of the Coral Sea). As it turned out, the sailors aboard the *Shōkaku* and *Zuikaku* would never see the other carriers of the Kidō Butai again. In the meantime, American aircraft carriers USS *Hornet* (CV-8) and USS *Enterprise* (CV-6) delivered an unexpected strike on the Tokyo Bay area. *Akagi*, *Hiryū* and *Sōryū*, then in a position between Formosa and Luzon, changed course and increased speed to intercept the enemy, but their pursuit was fruitless.

22 April 1942: *Hiryū* returned to Sasebo. The ship received much-needed routine maintenance and replenishment during the first longer break from combat since the start of the war. While awaiting further dispositions at Hashirajima anchorage, the carrier's air group was moved to train from the Tomitaka Air Base. Around this time, Rear Admiral Yamaguchi decided to shift his flag from *Sōryū* to *Hiryū*, which offered better facilities for his staff.

Early May 1942: Concentration of the Japanese ships commenced in preparation for the next major action: Operation *MI*. By landing on the Midway Atoll (west of Hawaii), Admiral Yamamoto and his staff planned to draw the American carriers into battle and destroy them. Unknown to the Japanese, their ciphers had been broken and the Americans knew exactly what the Combined Fleet was about to do.

27 May 1942: The Kidō Butai departed Hashirajima and set course for Midway. Being only one of the Japanese task forces involved in the operation, the First Carrier Striking Force consisted of the following: carriers *Akagi*, *Kaga*, *Hiryū* and *Sōryū*, battleships *Haruna* and *Kirishima*, heavy cruisers *Tone* and *Chikuma*, light cruiser *Nagara* and 11 destroyers. Having suffered damage during the battle of the Coral Sea on 8 May, *Shōkaku* and *Zuikaku* were not able to participate.

4 June 1942, 0428hrs local time: Battle of Midway. The carriers of the Kidō Butai launched their strike from a distance of 250 miles north-west of the atoll. The aircraft from *Hiryū* included 18 Nakajima B5N2s (one of them aborted due to technical problems) and nine



North-west of Midway, morning of 5 June 1942. Another image shot by the aircraft from *Hōshō*. Sailors on deck were reported by the scout crew, but none are visible here. The whole fore part of the flight deck has been destroyed and collapsed to the hangar below. After many hours, the fires are still not out and the ship is surrounded by smoke. (Naval History & Heritage Command, NH 73065)

Mitsubishi A6M2s (three of which were intended for CAP). Lieutenant Commander Fuchida from *Akagi* was sick and unable to lead the attack, so Lieutenant Jōichi Tomonaga from *Hiryū* was selected as the striking force commander. The orders were to destroy the atoll's military installations.

4 June 1942, 0617–0725hrs: The formation attacked Midway, but the defenders were well prepared and the Japanese encountered fierce opposition in the form of fighters and intense anti-aircraft fire. The bombers were able to inflict serious damage on the atoll's two islands, but Tomonaga radioed to the carriers that a second strike would be necessary to wipe out Midway's defences. *Hiryū*'s aircraft suffered the heaviest losses of all the formations participating in the attack. All Zeroes returned to their mother ship (two of them damaged), but five Kates were lost and a further five were so badly damaged that they were deemed unserviceable.

4 June 1942, 0710hrs: Land-based torpedo bombers launched from Midway attacked the Kidō Butai. Twin-engined B-26 Marauders targeted *Akagi*, while TBF Avengers went for *Hiryū*. None of the torpedoes hit their targets. Japanese CAP shot down seven enemy aircraft and one of *Hiryū*'s Zeroes was lost.

4 June 1942, 0745hrs: One of *Tone*'s reconnaissance aircraft reported sighting an enemy task force to the north-east of the Kidō Butai. This came as a shocking surprise to Nagumo, and he quickly ordered his crews to rearm the aircraft in the hangars with anti-ship ordnance. The presence of American ships was a part of a careful plan to set a trap against the Japanese. Task Force 16 included carriers USS *Enterprise* (CV-6) and USS *Hornet* (CV-8), while Task Force 17 had a single carrier – USS *Yorktown* (CV-5).

4 June 1942, 0755hrs: *Hiryū* was attacked by 16 SBD Dauntless bombers from Midway. No hits were scored, and six of the American aircraft were shot down for the price of one of the carrier's Zeroes. Shortly after, 12 four-engine B-17s appeared at high altitude above the Kidō Butai, four of which aimed their bombs at *Hiryū*. The ship managed to evade them all by rapid manoeuvring.

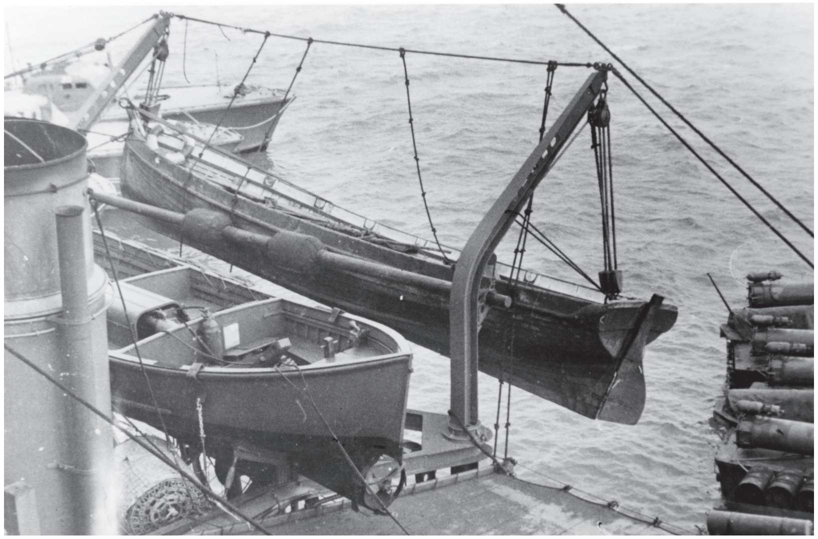
4 June 1942, 0900–0910hrs: The Midway strike formation returned to the Japanese force and *Hiryū* recovered her aircraft.

4 June 1942, 0920–1000hrs: The first American carrier aircraft attacked. Fifteen TBD Devastators of VT-8 from *Hornet* attempted to drop their torpedoes in the path of *Sōryū*, but all were shot down, gaining no hits. Fourteen Devastators (VT-6 from *Enterprise*) struck shortly afterwards, but did not fare much better; ten of them were lost to Japanese CAP, and their target, the carrier *Kaga*, escaped unscathed.

4 June 1942, 1015–1030hrs: Another formation of Devastators (VT-3 from *Yorktown*) attacked *Hiryū*, this time accompanied by six F4F Wildcats (VF-3 from *Yorktown*). The strike was unsuccessful, but escort fighters managed to take down three of the carrier's Mitsubishi Zeroes. Shortly after came the pivotal moment of the battle. The Japanese, busy with repelling continuous attacks, failed to detect another opponent above them: American aircraft approached undetected and hit their mark unopposed. Almost simultaneously, three formations of SBD Dauntlesses (VB-6 and VS-6 from *Enterprise* and VB-3 from *Yorktown*) dived on the Kidō Butai. *Akagi*, *Kaga* and *Sōryū* were all hit, with fires raging on their decks and in their hangars. Eventually, the blows turned out to be fatal to the three ships. *Hiryū* escaped undamaged.

4 June 1942, 1054hrs: Having finally completed preparations, *Hiryū* launched her strike against the enemy carriers. The strike consisted of 18 Aichi Vals and six escorting Mitsubishi Zeroes. Lieutenant Michio Kobayashi was the leader of the formation. The fighters engaged *Enterprise*'s SBD Dauntlesses that were spotted on the way to the target. Two of the Zeroes were badly damaged and had to turn back, while the other four temporarily lost contact with the Vals.

Aboard seaplane tender USS *Ballard* (AVD-10), late June 1942. By the time the battle of Midway was over, the row cutter seen here hanging under the davits was all that was left from the once-proud aircraft carrier *Hiryū*. The boat was used by engine room personnel who managed to reach the flight deck long after the rest of the surviving crew had been picked up by Japanese destroyers. They drifted on the ocean for two weeks before being spotted by a scout PBY Catalina flying boat.
(National Archives, 80-G-79981-21)



4 June 1942, 1210hrs: Kobayashi's formation attacked *Yorktown*. The carrier was fiercely defended by escorting F4F Wildcats, and three Zeroes along with 11 Vals were shot down during the approach. Out of the seven remaining dive bombers, a further two were taken down by anti-aircraft artillery. Nevertheless, heavy damage was inflicted on the carrier – three hits and two near misses were achieved. The Japanese were certain that *Yorktown* was about to sink within minutes.

4 June 1942, 1330hrs: *Hiryū* launched a second wave with the intention to hit another American carrier. The formation included ten Nakajima B5N2s (one was from *Akagi*) and six Mitsubishi A6M2s (two from *Kaga*). Tomonaga, whose aircraft was damaged and barely had enough fuel to return to *Hiryū*, led the strike.

4 June 1942, 1434hrs: Tomonaga's force attacked what he thought was a different carrier. In reality, *Yorktown*'s crew had managed to contain the fires and put the ship in motion, so she appeared undamaged. Escorting F4F Wildcats boldly defended the carrier, but three of them were shot down by Zeroes. Two torpedo hits were scored on *Yorktown*, immobilising the ship and causing a heavy list. She would eventually sink on 7 June. In the meantime, the badly battered Japanese strike force landed on *Hiryū*. Only five Kates and four Zeroes managed to return. All the others, including Tomonaga's aircraft, fell victim to American fighters and anti-aircraft fire. Yamaguchi ordered the crew to prepare to launch a third wave as soon as possible.

4 June 1942, 1700hrs: A large group of SBD Dauntlesses launched by *Enterprise* and *Hornet* approached *Hiryū*. The attackers were spotted late, but escort Zeroes still managed to shoot down three of them before they dropped their ordnance. Despite the fighters' efforts and the carrier's rapid manoeuvring, *Hiryū* was hit by four 1,000lb bombs. All impacts were close to each other on the fore portion of the flight deck, one of them on top of elevator no. 1, a large fragment of which was thrown up from its original position and landed aftwards leaning against the superstructure.

4 June 1942, 1715–2100hrs: Fierce fires immediately broke out, accompanied by explosions of aircraft and ordnance in the hangars. In spite of the damage control groups' efforts, it was impossible to contain the situation. Nevertheless, the ship's machinery was intact and *Hiryū* was still capable of maintaining high speed, although some smoke and heat was entering the engine rooms through ventilation ducts. The fore part of the flight deck collapsed, rendering it unusable. The CAP fighters circling above had to ditch one by one as their fuel tanks emptied.

4 June 1942, 2123hrs: As the ceilings of the engine rooms became red-hot, it was no longer possible to keep the machinery running. The ship came to a halt. The engine rooms' personnel were presumed dead, contact with them being lost.

5 June 1942, 0230hrs: Yamaguchi concluded that it was impossible to save *Hiryū*. The admiral and Captain Kaku addressed the gathered men and gave the order to abandon ship. Surviving crewmen were picked up by the destroyers *Kazagumo* and *Makigumo*. Yamaguchi and Kaku decided to go down with the carrier.

5 June 1942, 0510hrs: The commander of *Makigumo* carried out the task of scuttling *Hiryū*. One of the two Type 93 torpedoes fired at the carrier found its mark, hitting the starboard bow. As the destroyer was departing, men appeared on the flight deck, but *Makigumo* did not turn back. These were the crews of the engine rooms who had finally managed to escape.

5 June 1942, 0630hrs: A reconnaissance aircraft from *Hōshō* located *Hiryū*'s wreck lying dead in the water, but surprisingly not yet sinking. Photographs were taken and crewmembers were observed on the deck.

5 June 1942, 0912hrs: *Hiryū* finally sank shortly after 39 men evacuated in a row cutter. Around 400 men of the carrier's crew perished.

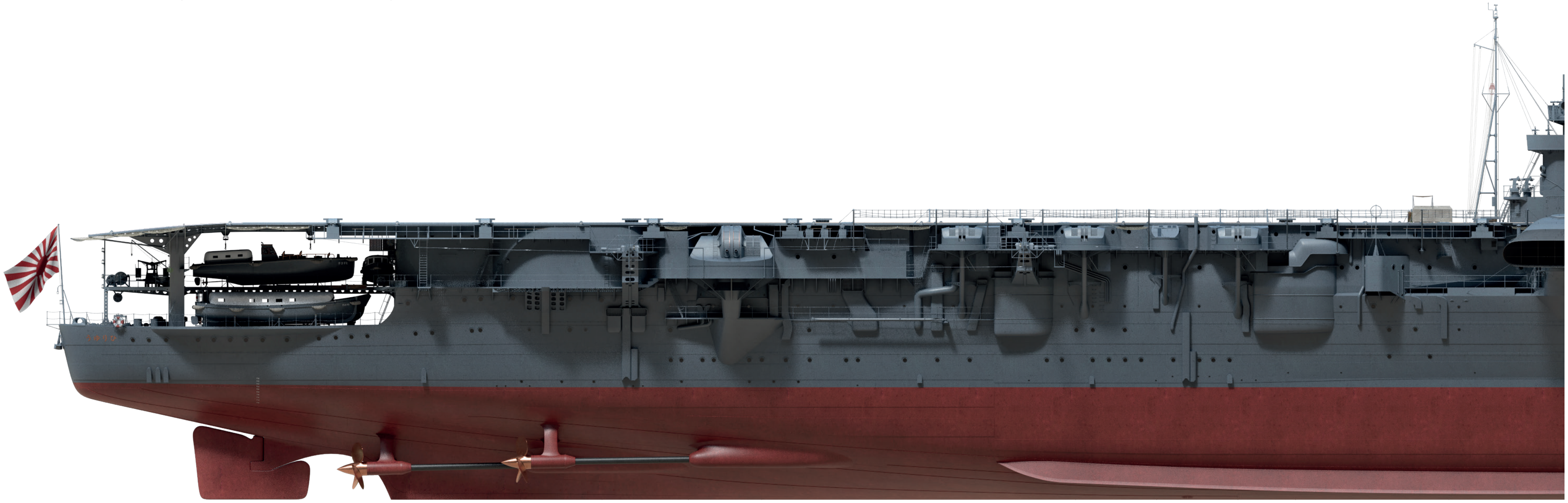
19 June 1942: Four of the survivors died while drifting in the cutter for days. The rest were rescued by the American seaplane tender USS *Ballard* (AVD-10).

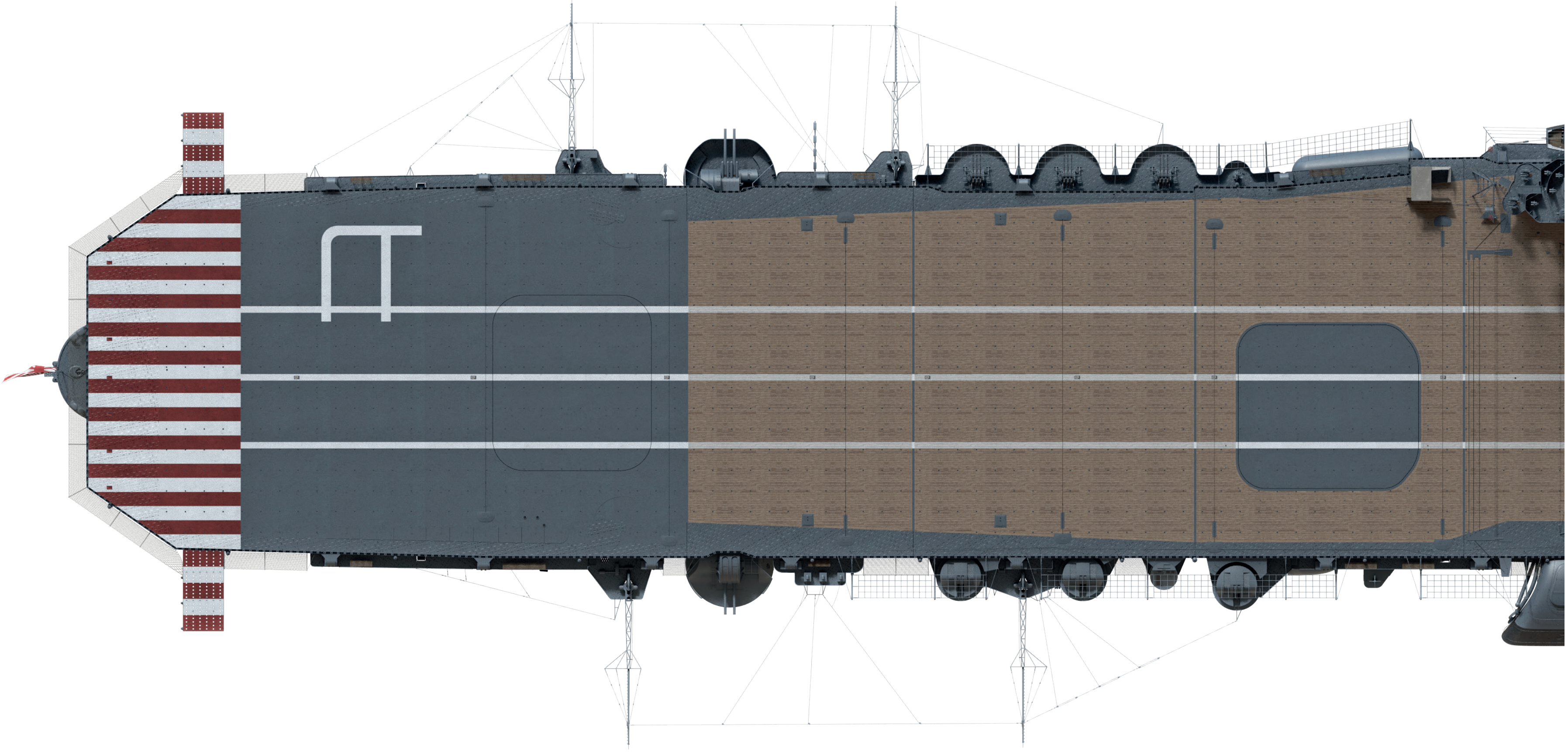
25 September 1942: *Hiryū* was removed from the Imperial Japanese Navy registry. The reason for doing this several months after the loss of the ship was probably an effort to hide the disastrous results of the battle of Midway from the public.

October 2019: Hulls of the *Akagi* and *Kaga* were found and filmed by researchers aboard RV *Petrel*. As of 2021, the exact location and condition of the wrecks of the *Hiryū* and *Sōryū* remain unknown.

PRIMARY VIEWS

1939–1940, shortly after commissioning





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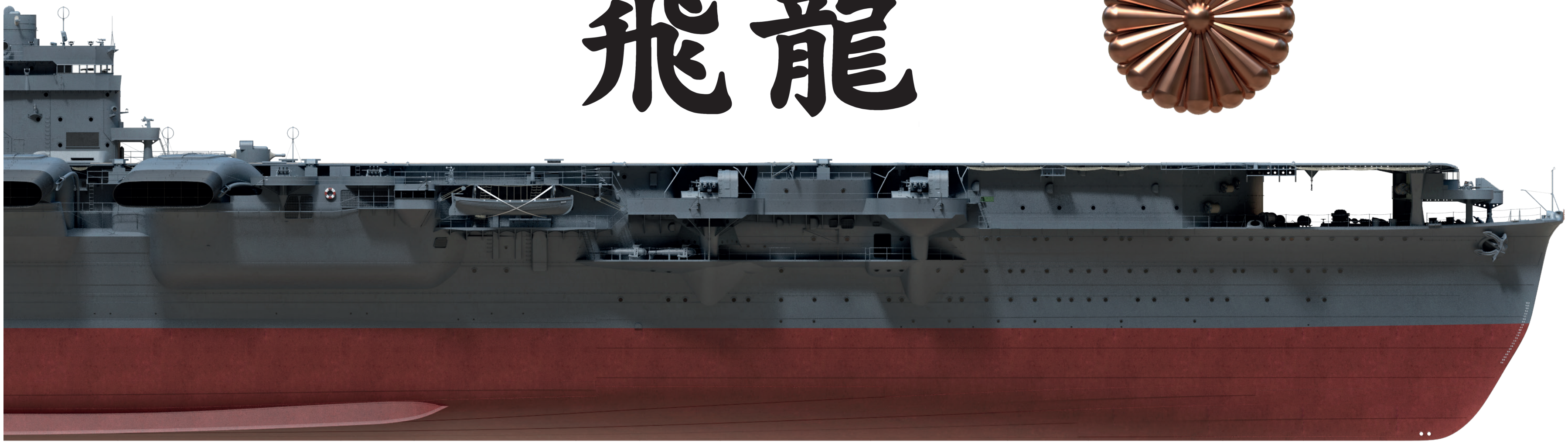
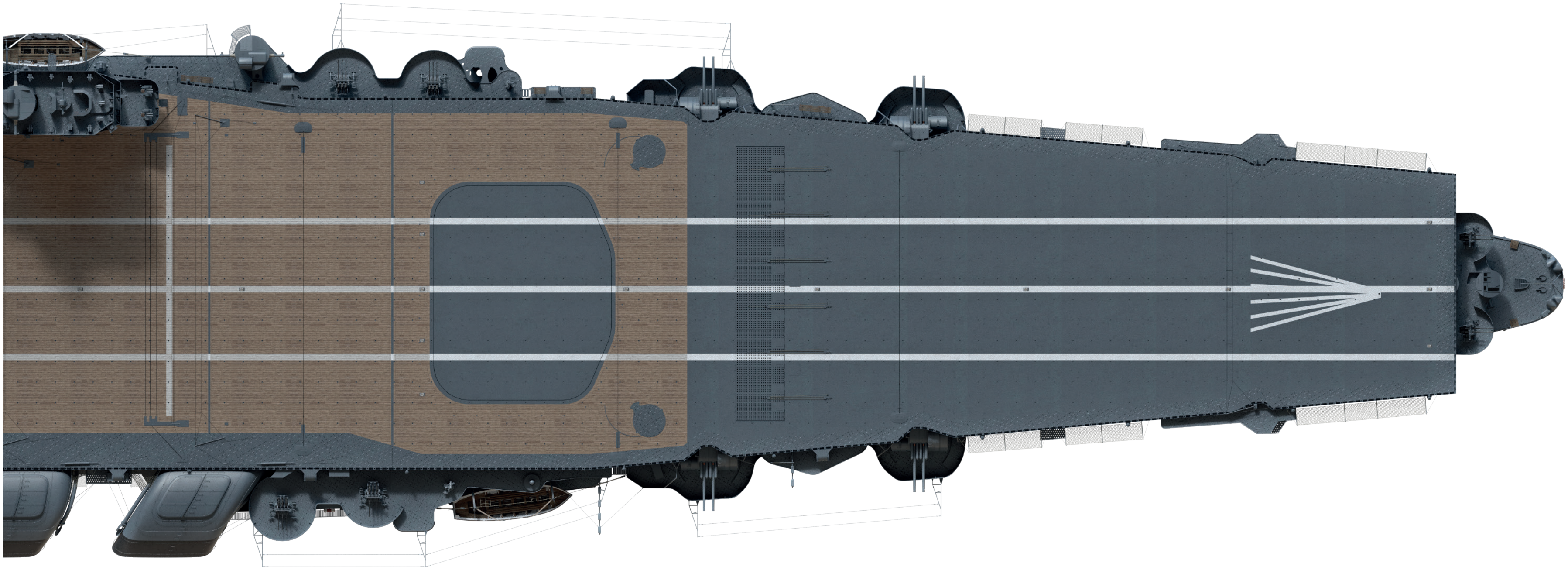
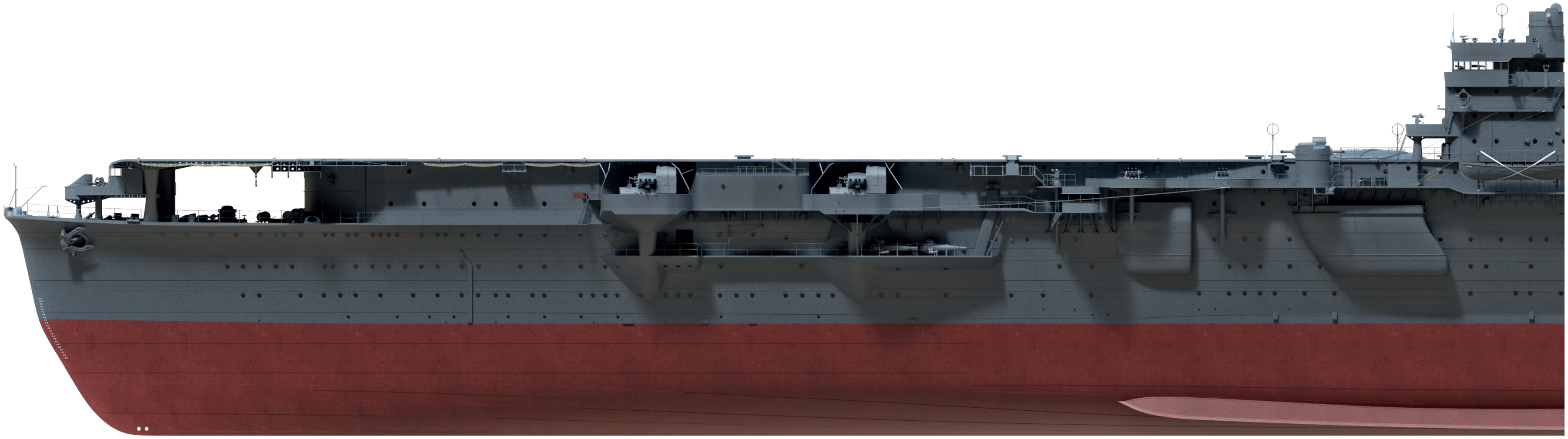


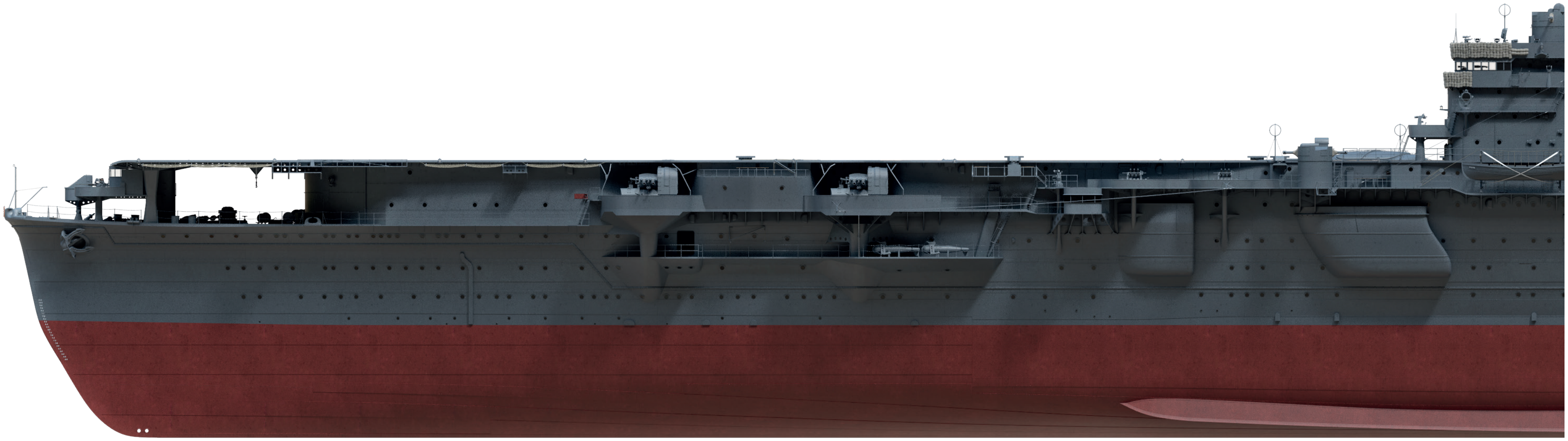


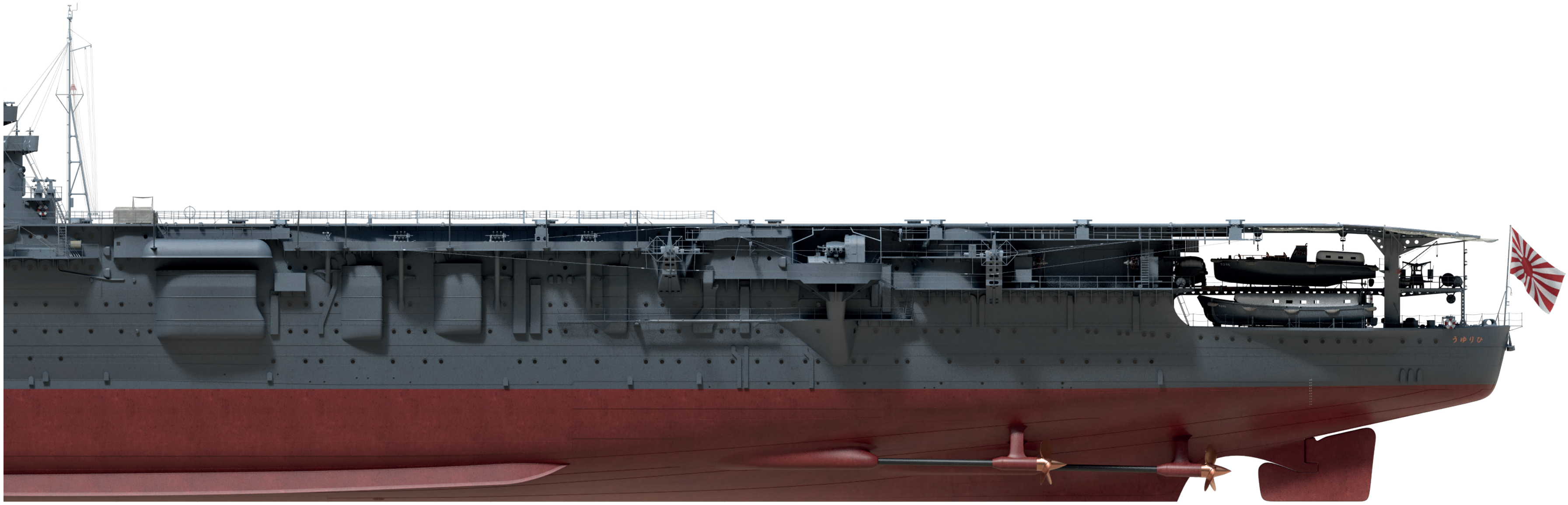
PRIMARY VIEWS

1939–1940, shortly after commissioning



7 DECEMBER 1941, first wave of attack on Pearl Harbor spotted on the flight deck

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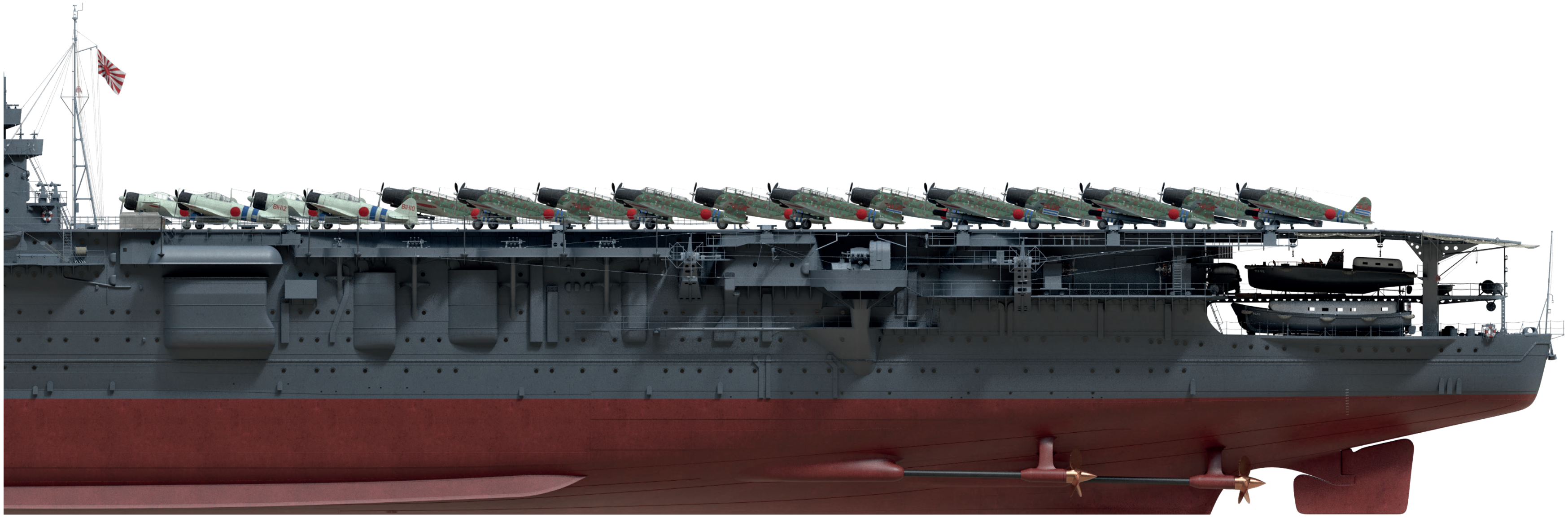
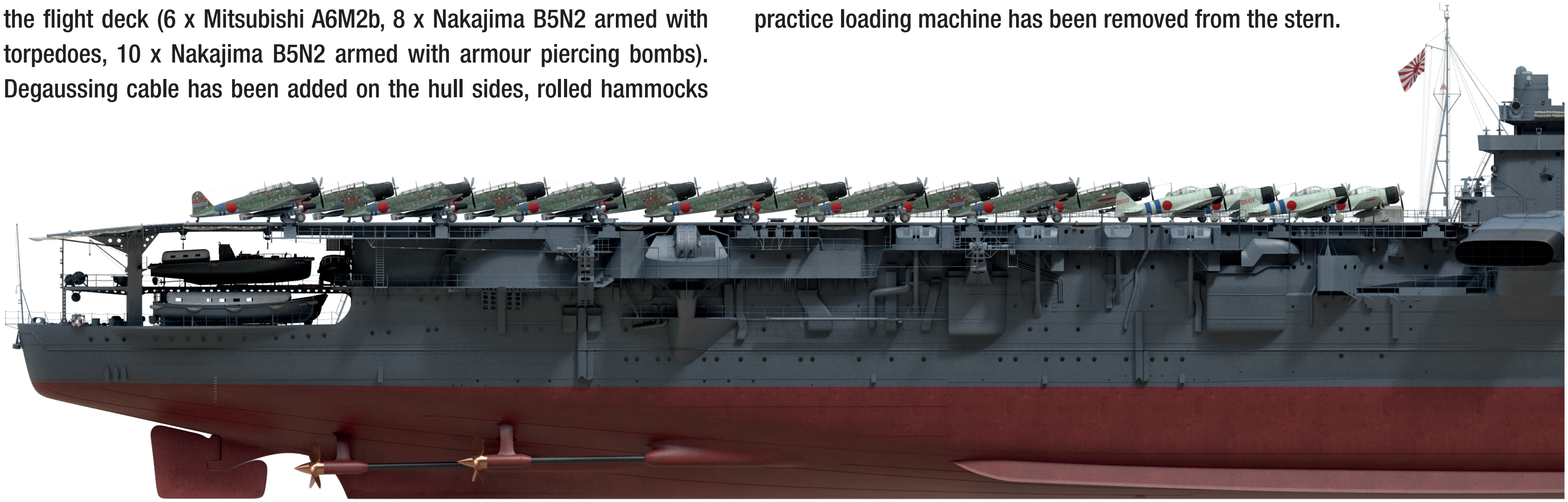
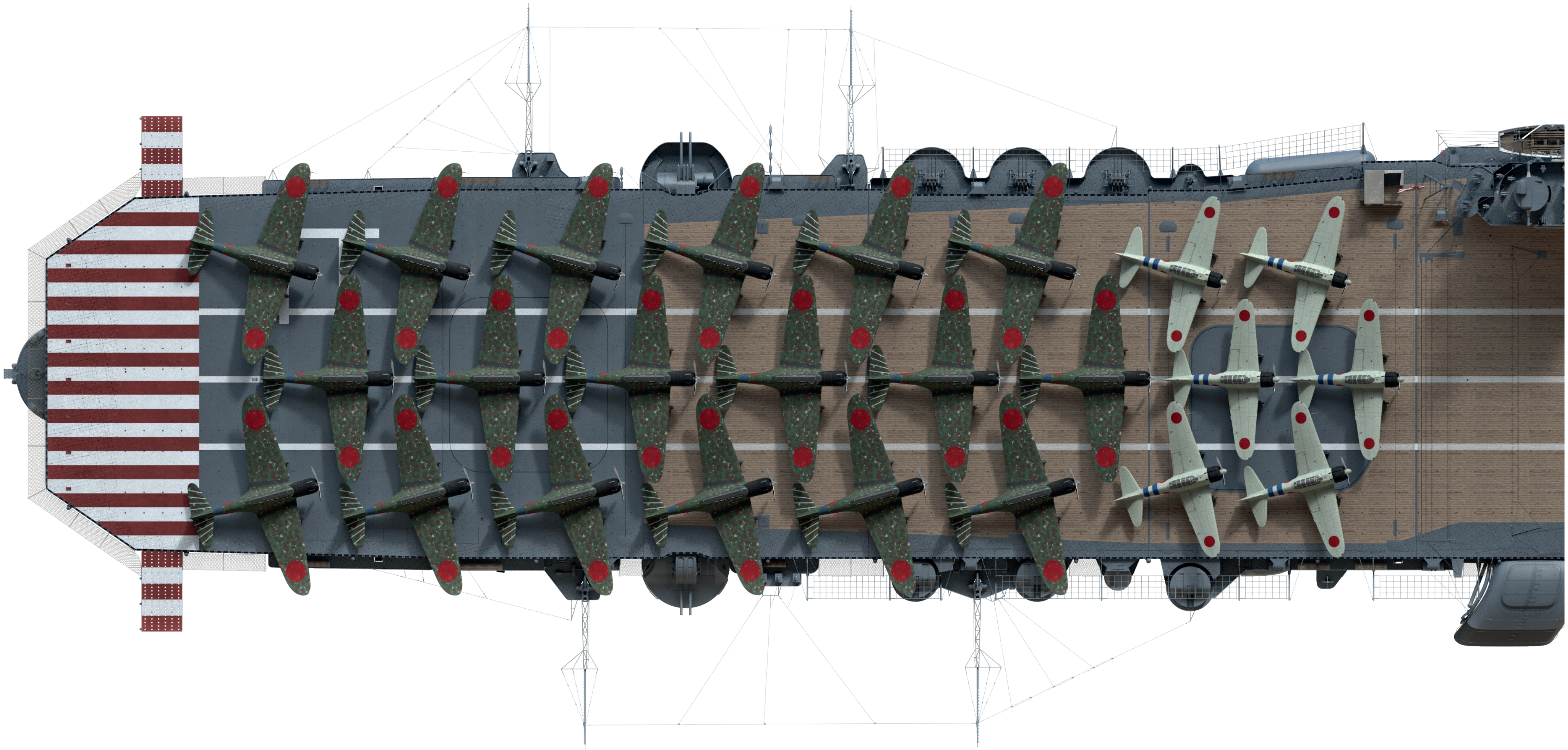
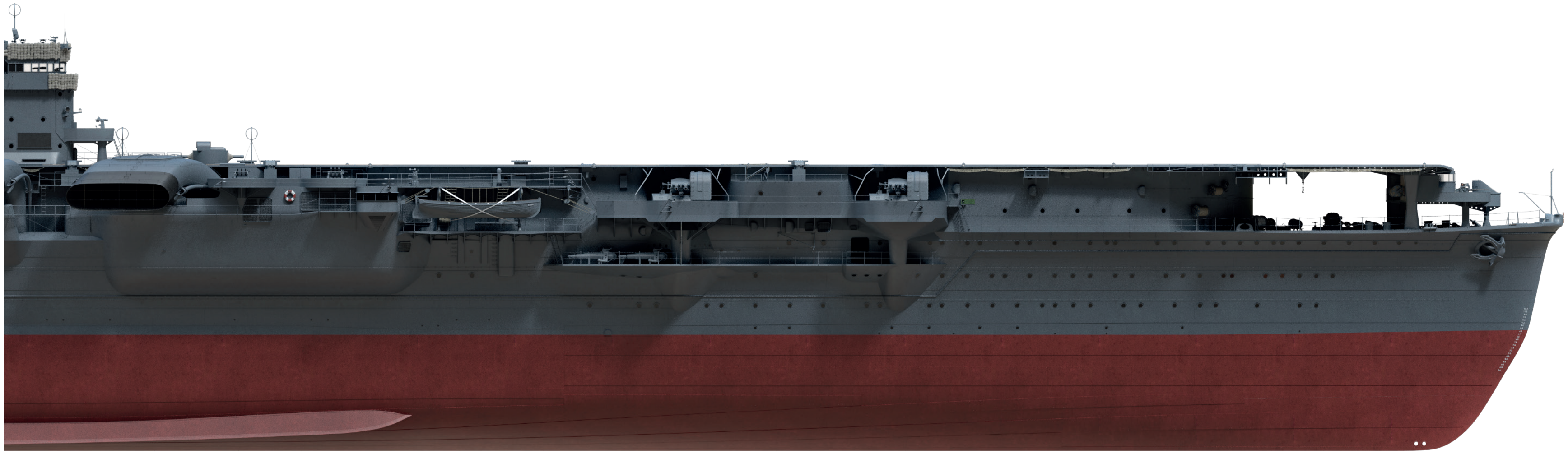
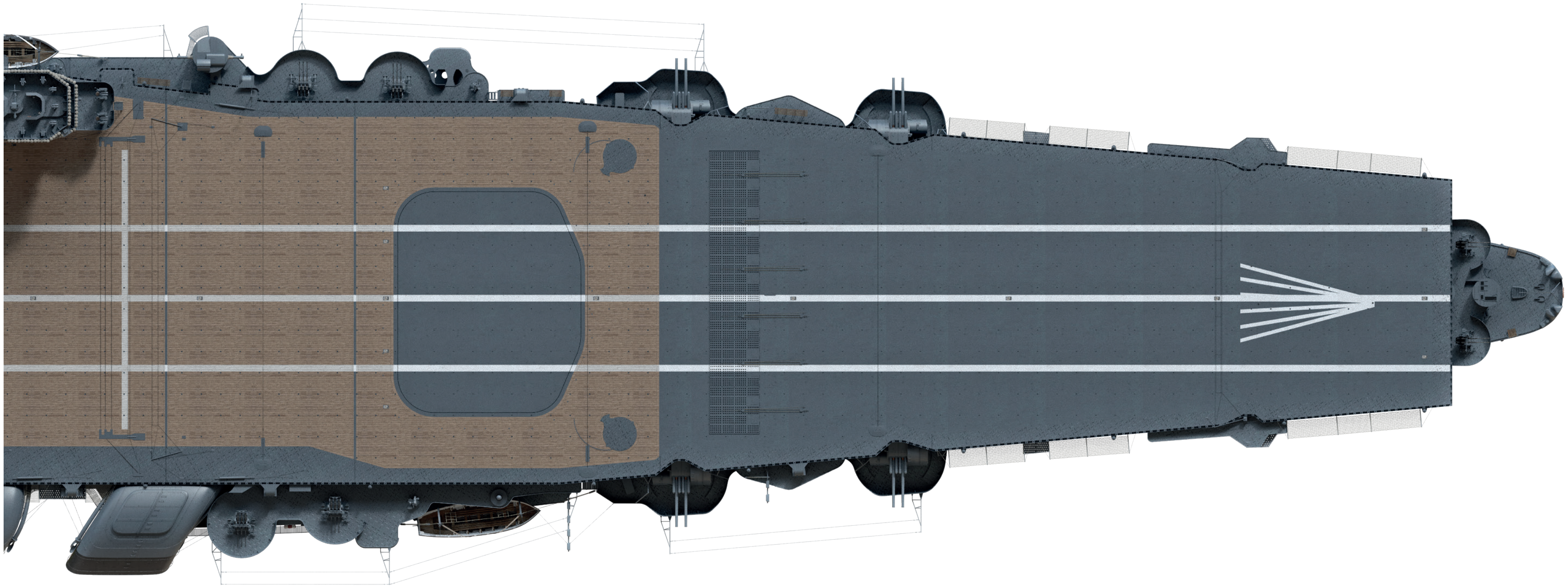


7 DECEMBER 1941, first wave of attack on Pearl Harbor spotted on the flight deck (6 x Mitsubishi A6M2b, 8 x Nakajima B5N2 armed with torpedoes, 10 x Nakajima B5N2 armed with armour piercing bombs). Degaussing cable has been added on the hull sides, rolled hammocks are used as an additional shielding of the superstructure, and 12.7cm practice loading machine has been removed from the stern.



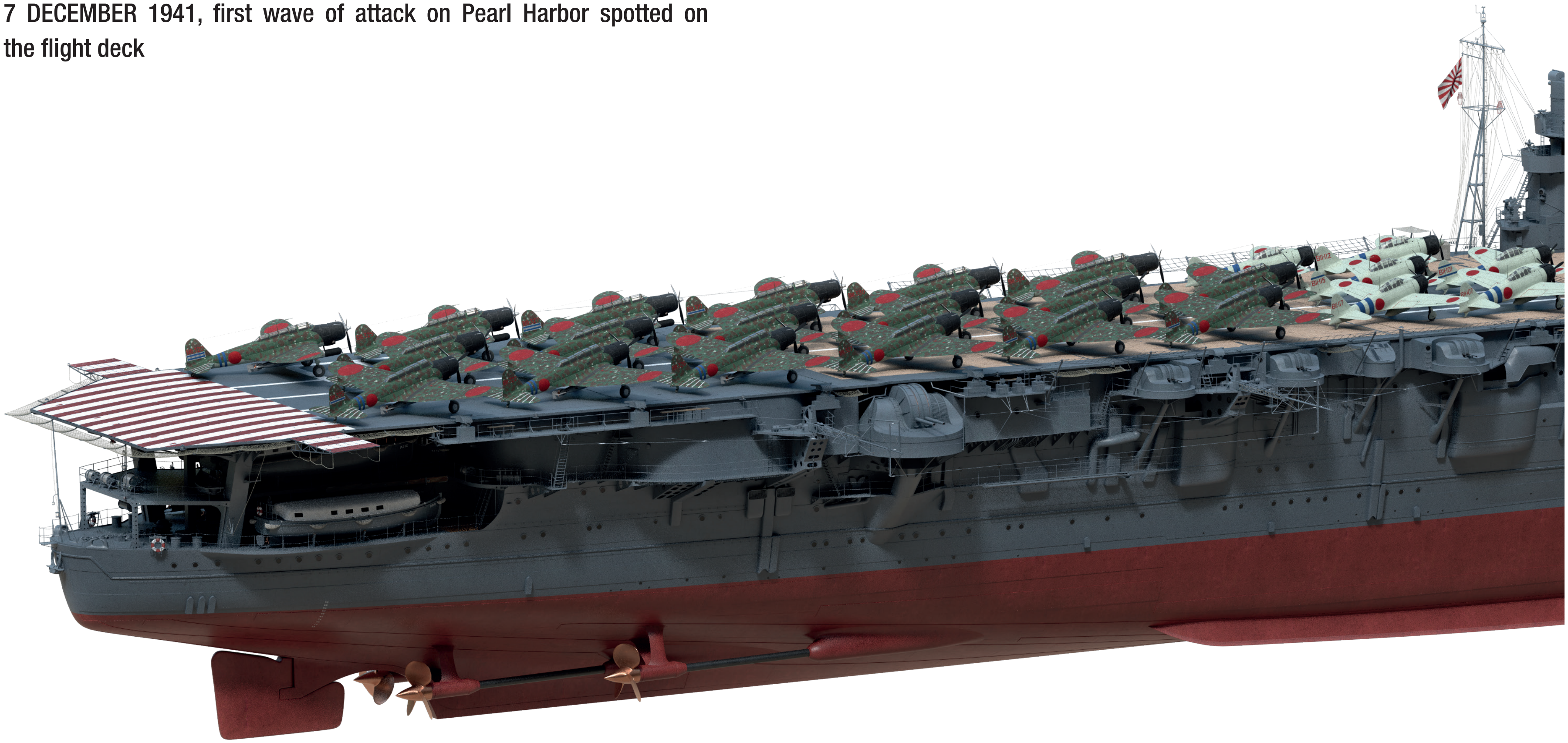


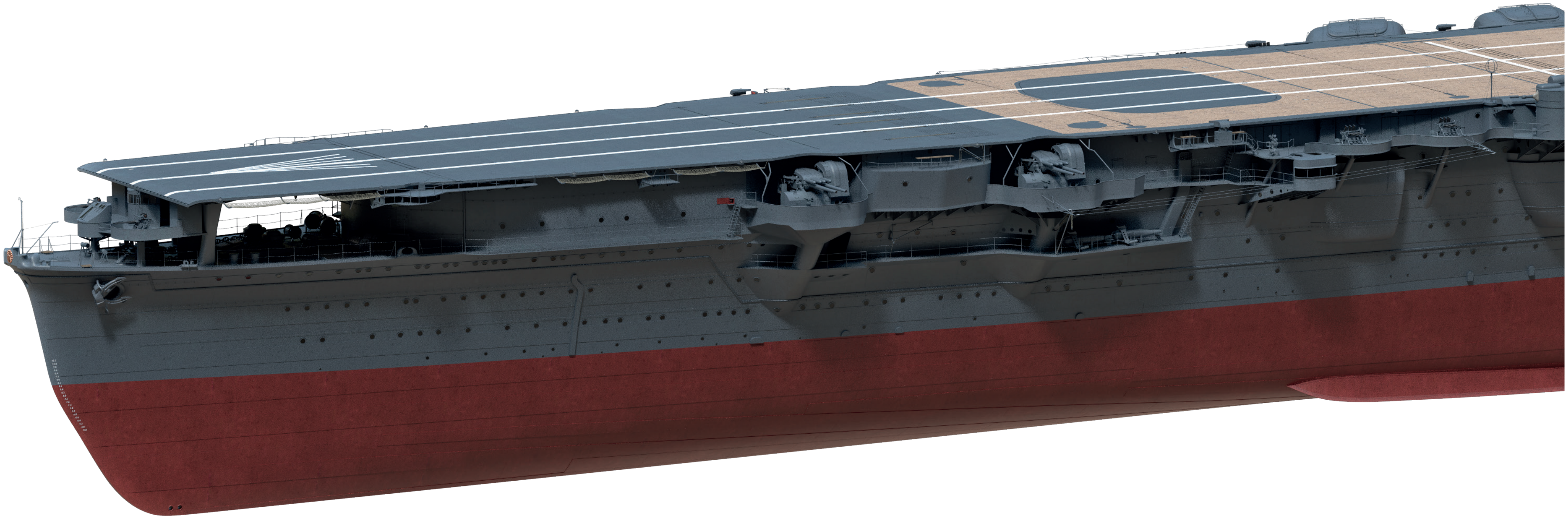


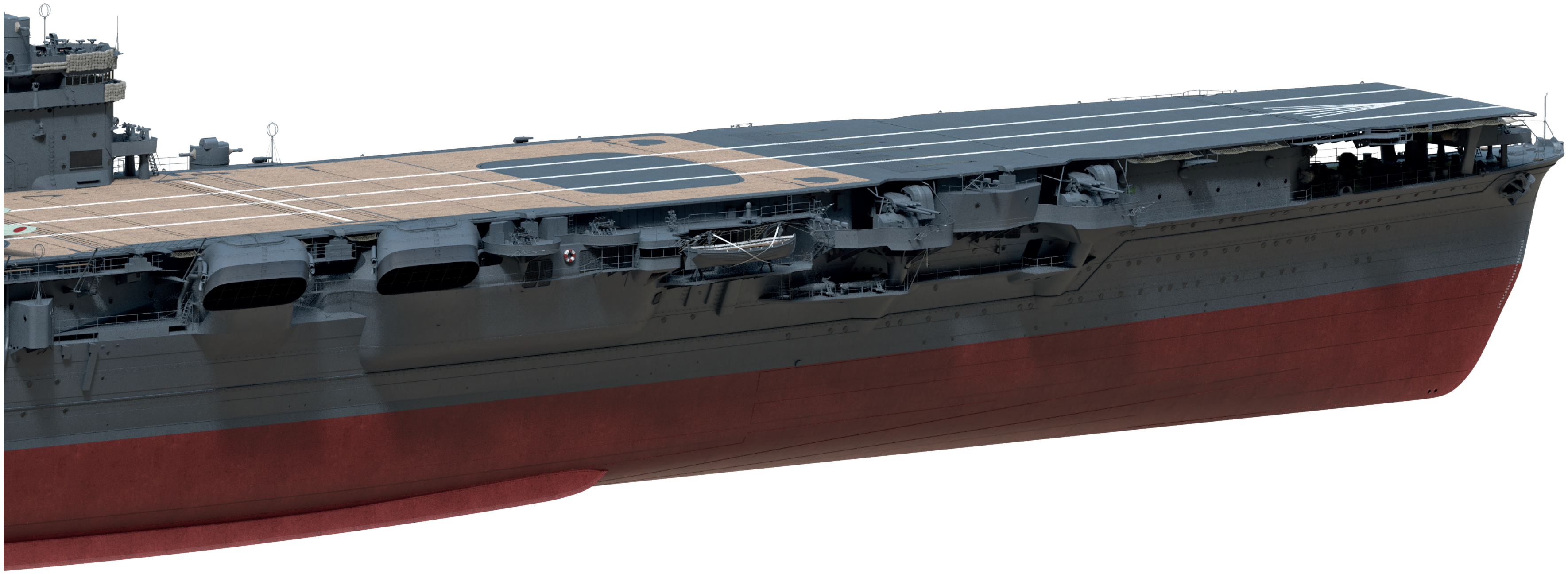


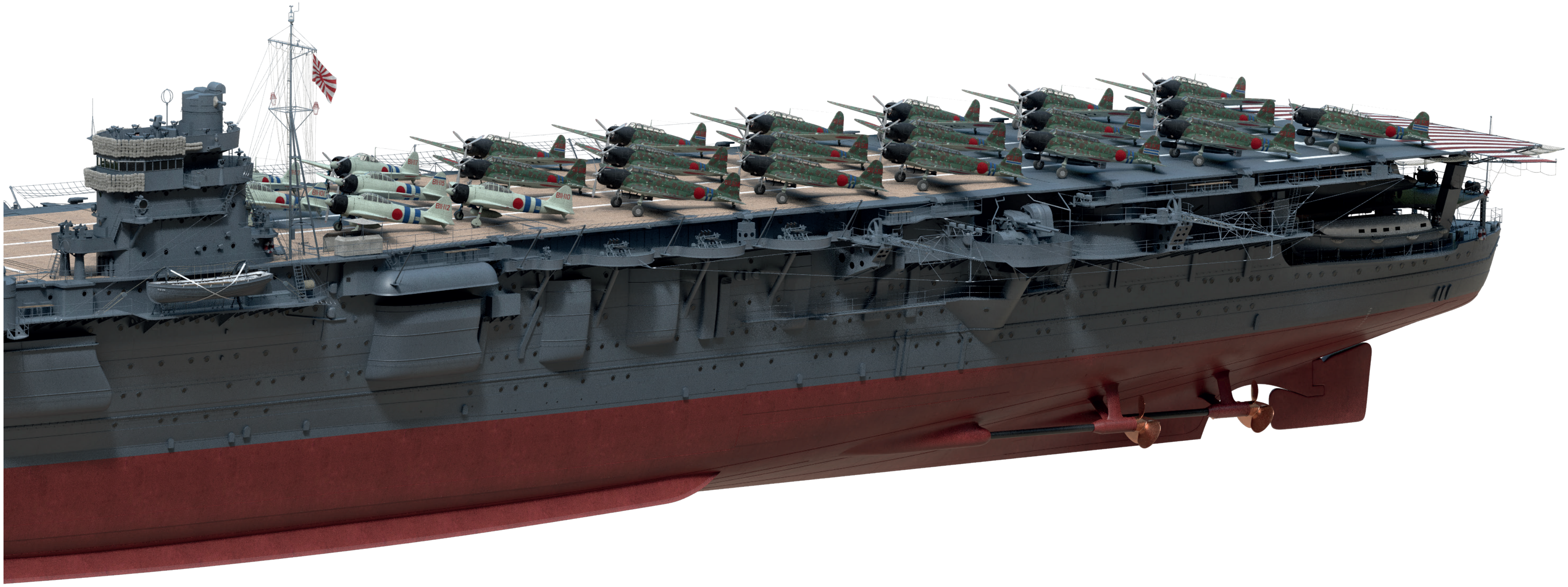
Note: while tail numbers of multiple *Hiryū's* aircraft participating in the attack are well known, it was impossible to determine all of them. Some of the tail numbers depicted on this and next pages are educated guesses.

7 DECEMBER 1941, first wave of attack on Pearl Harbor spotted on the flight deck

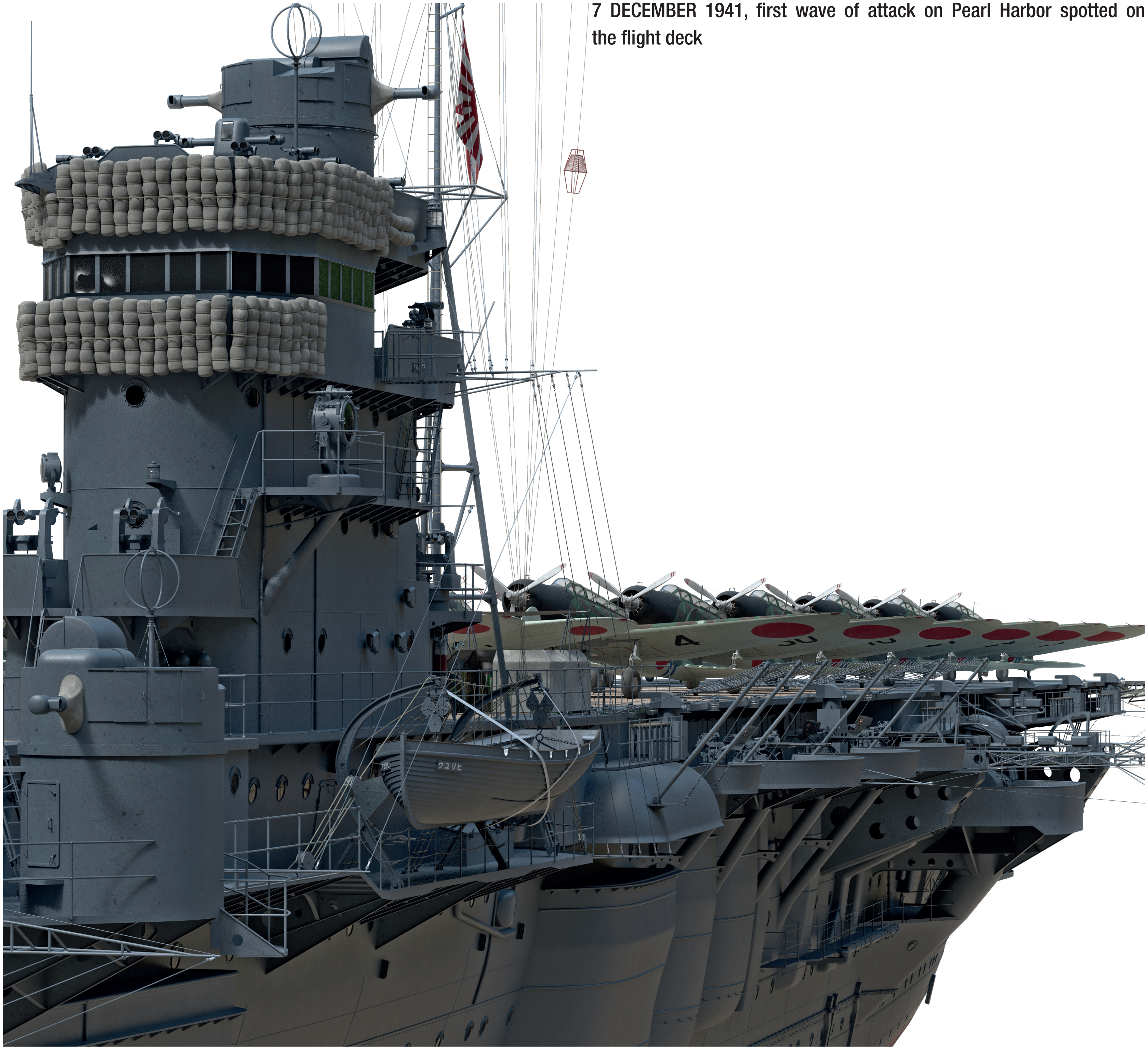


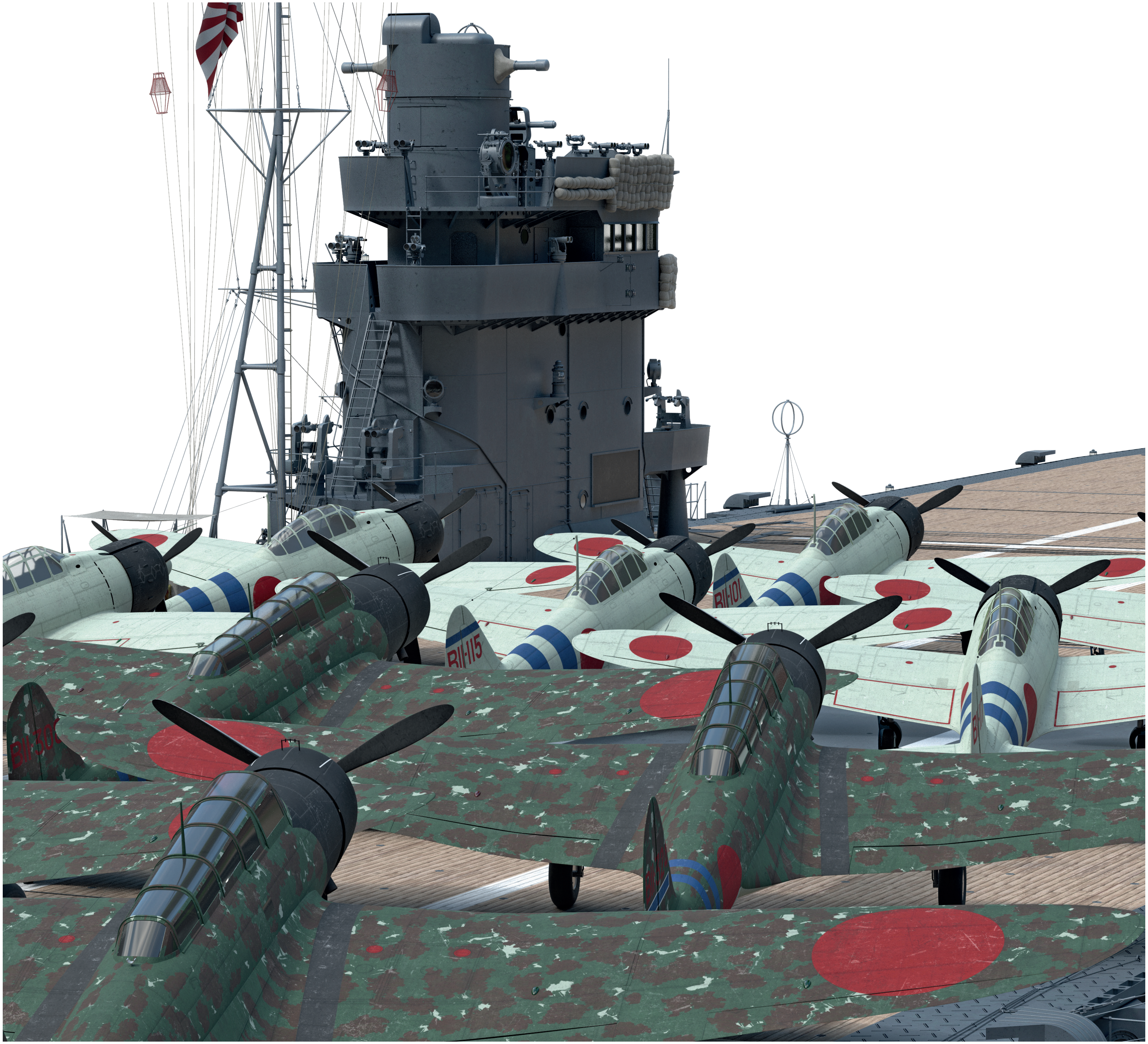






7 DECEMBER 1941, first wave of attack on Pearl Harbor spotted on the flight deck

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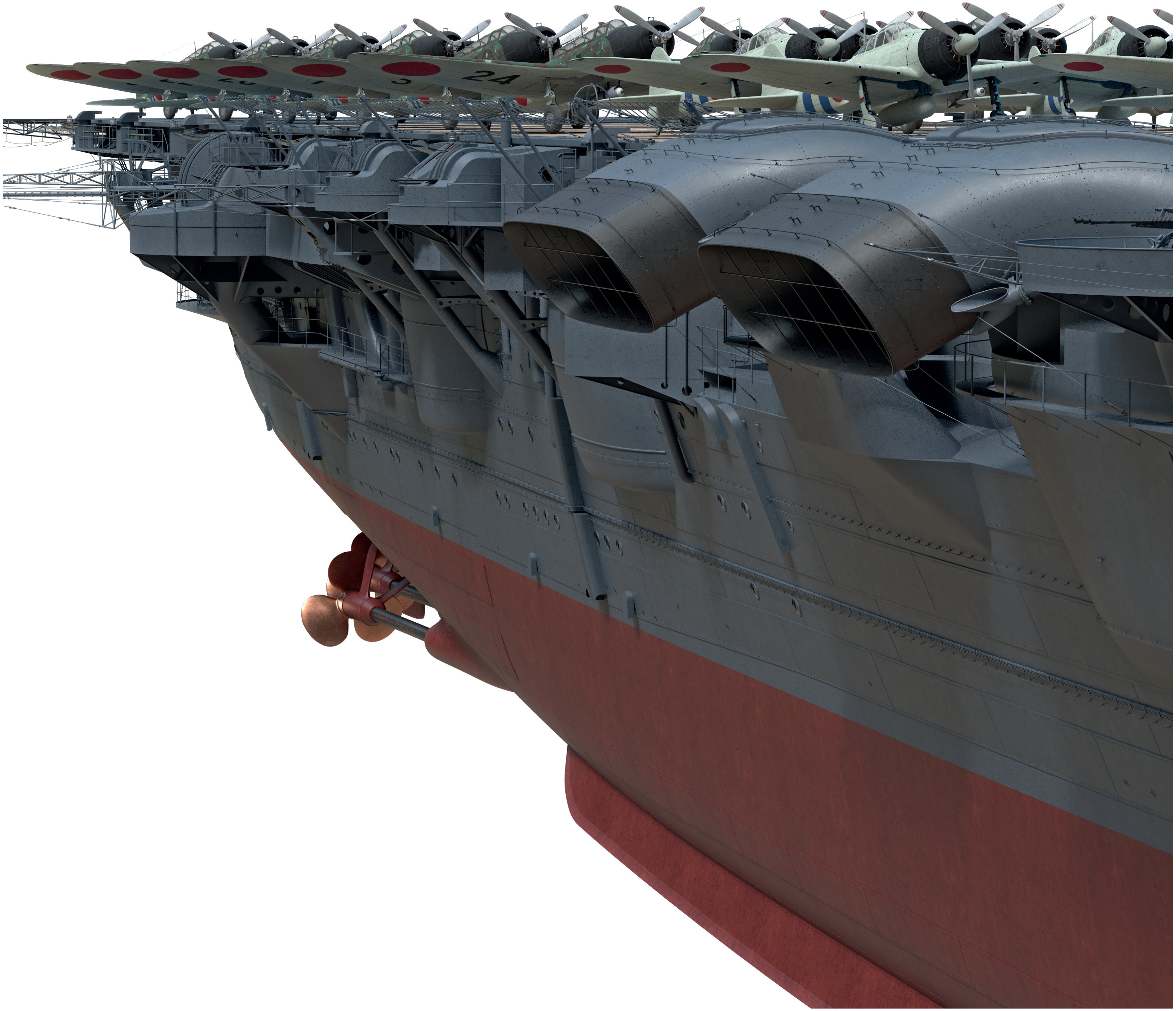
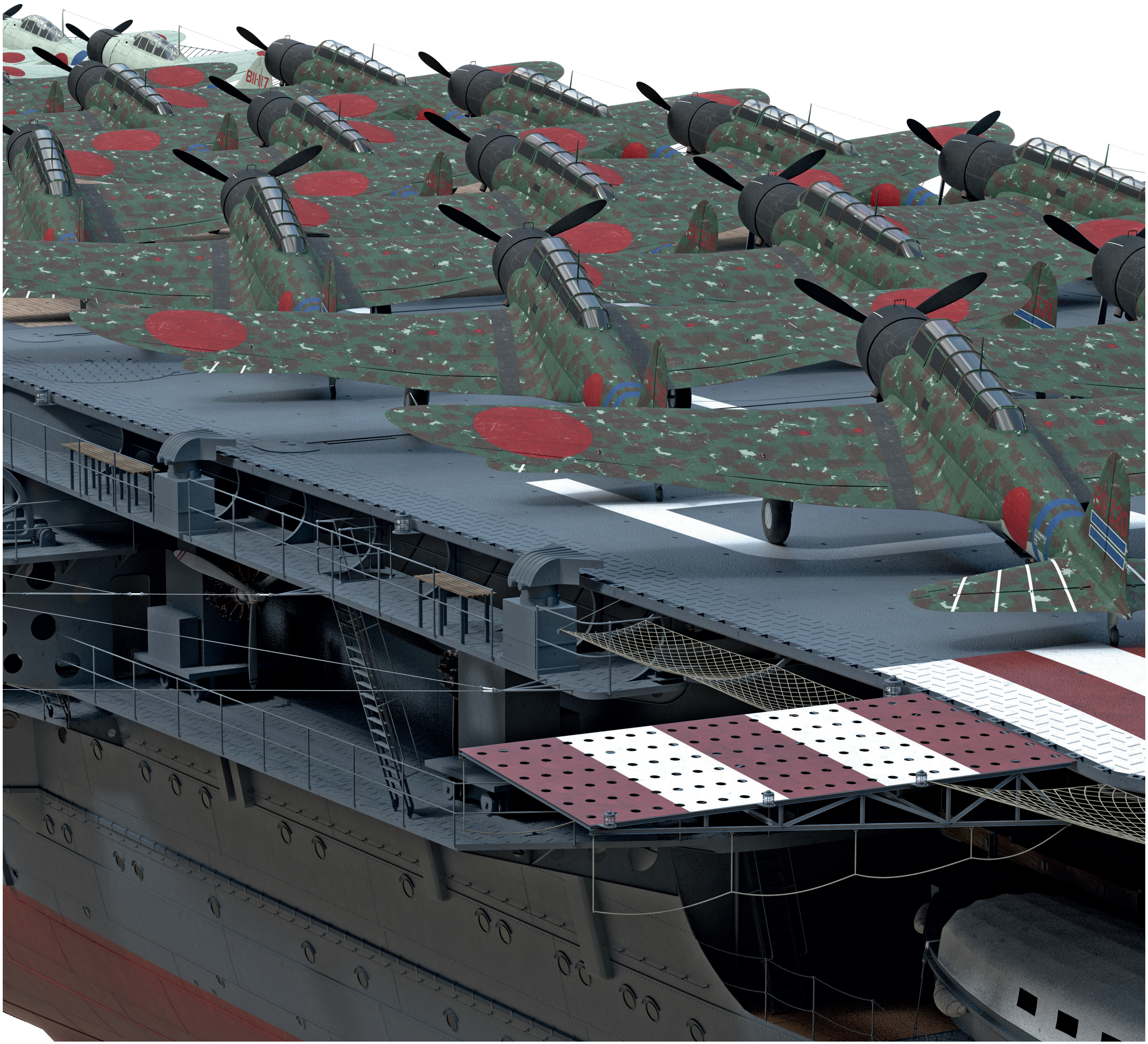
BII-30

7 DECEMBER 1941, first wave of attack on Pearl Harbor spotted on the flight deck

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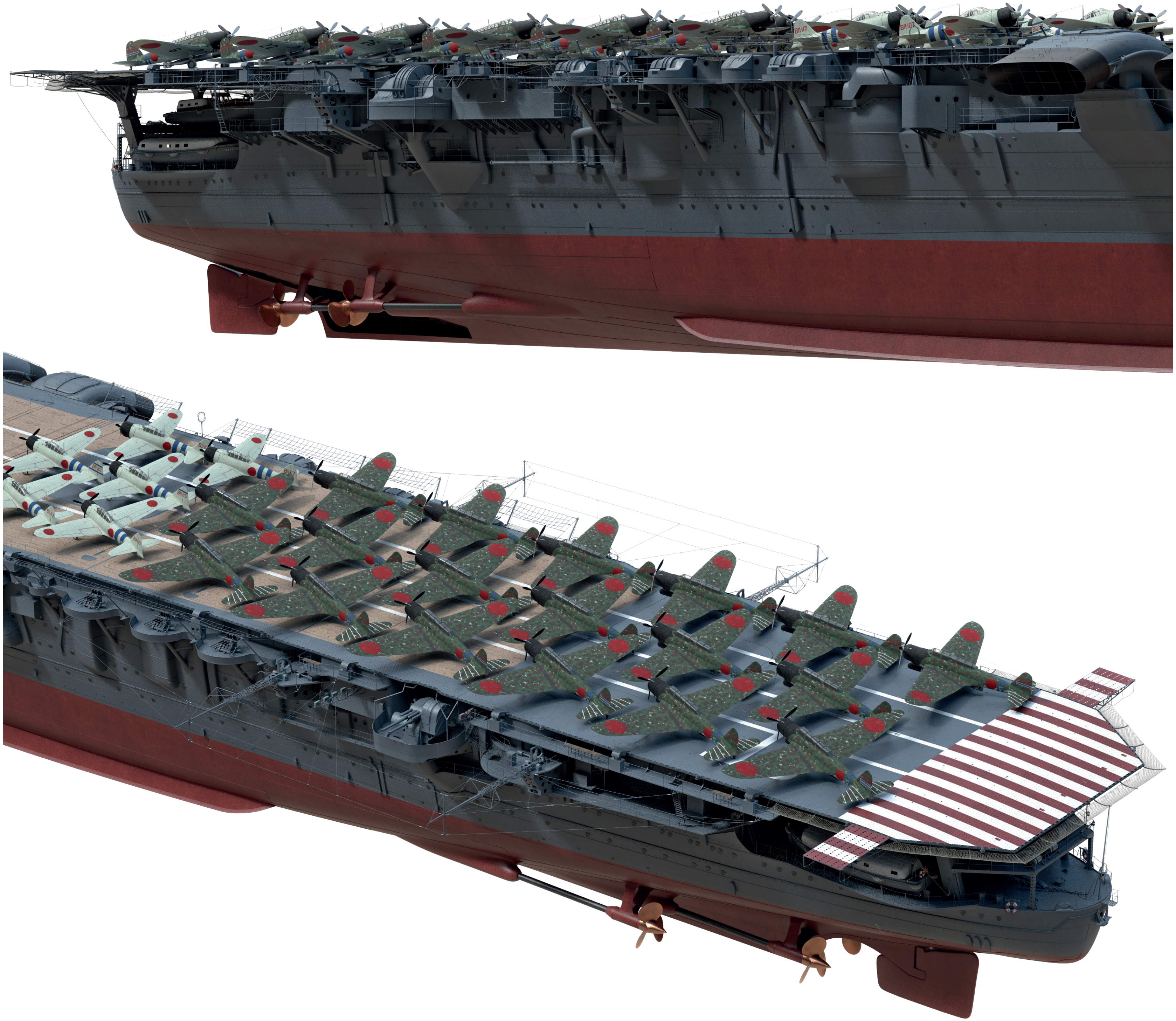
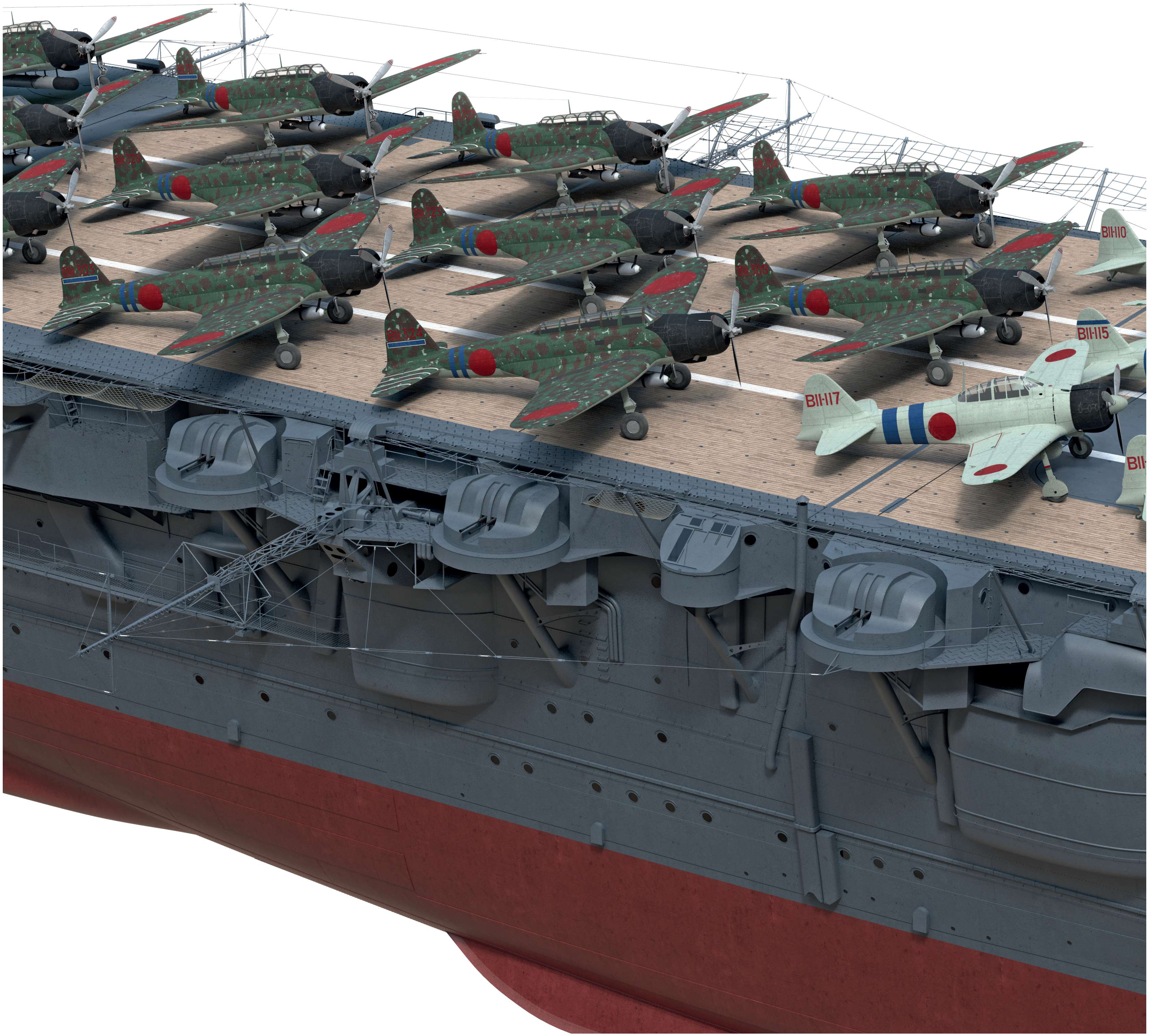
BII-320

7 DECEMBER 1941, first wave of attack on Pearl Harbor spotted on the flight deck

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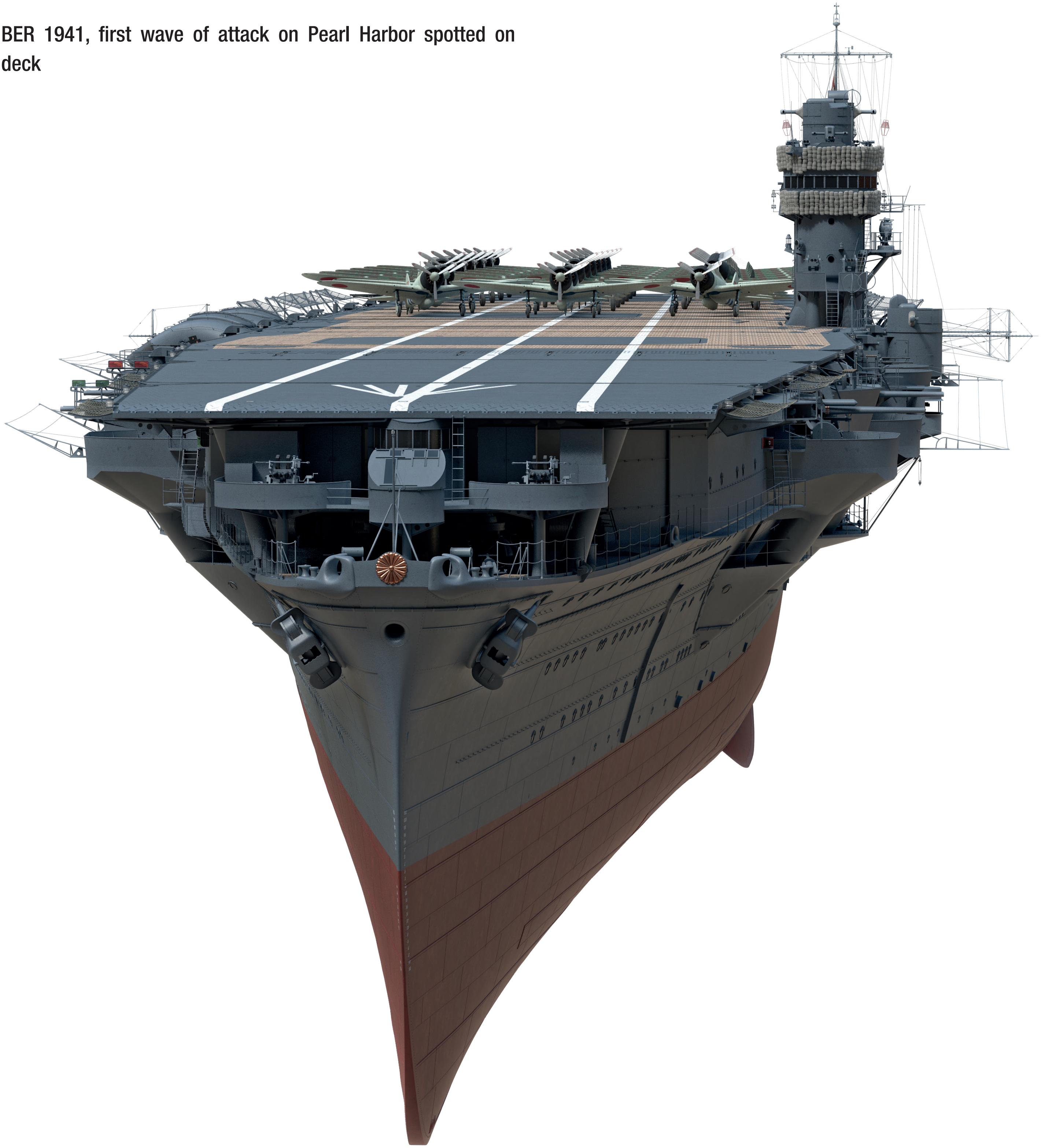
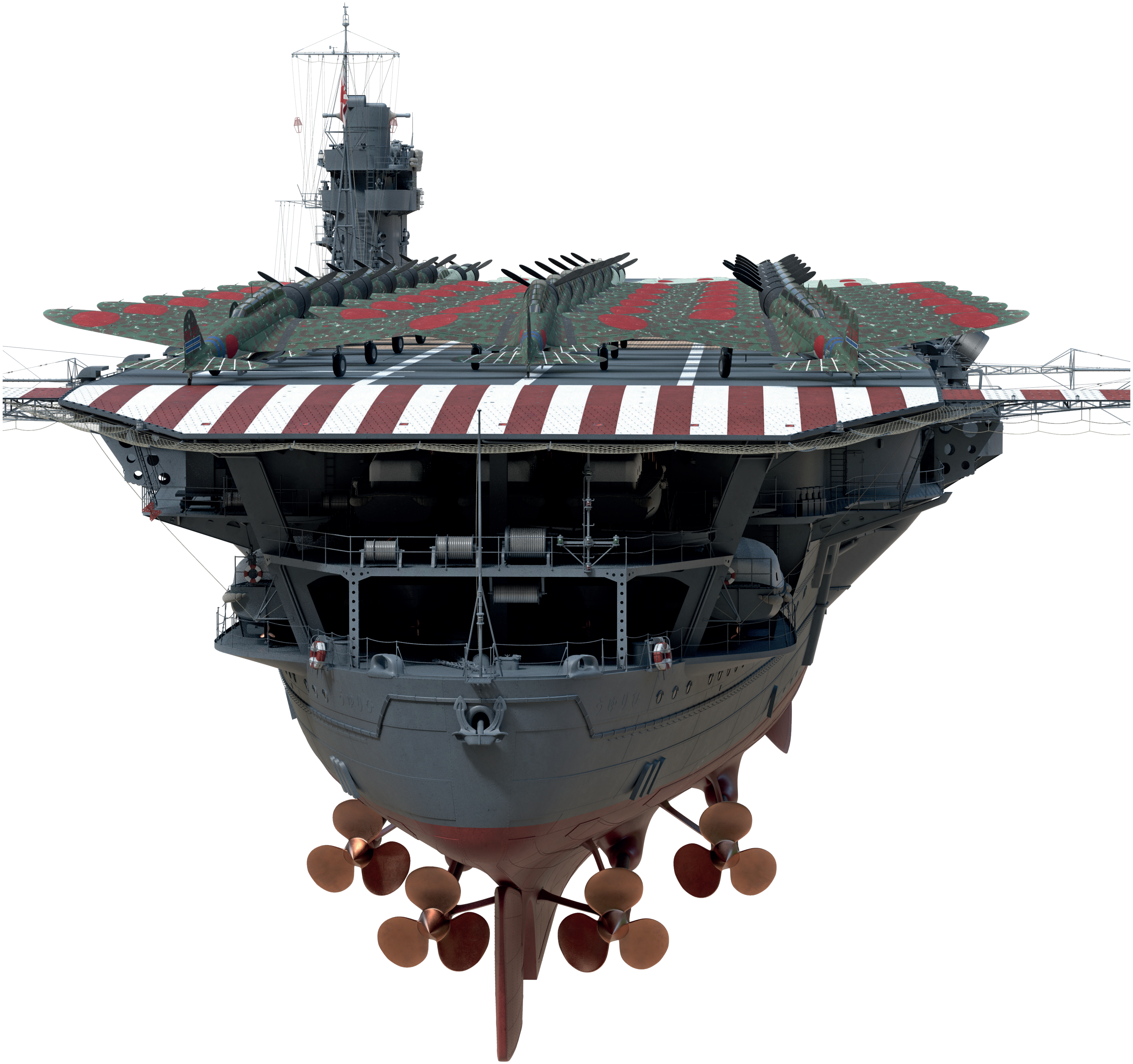
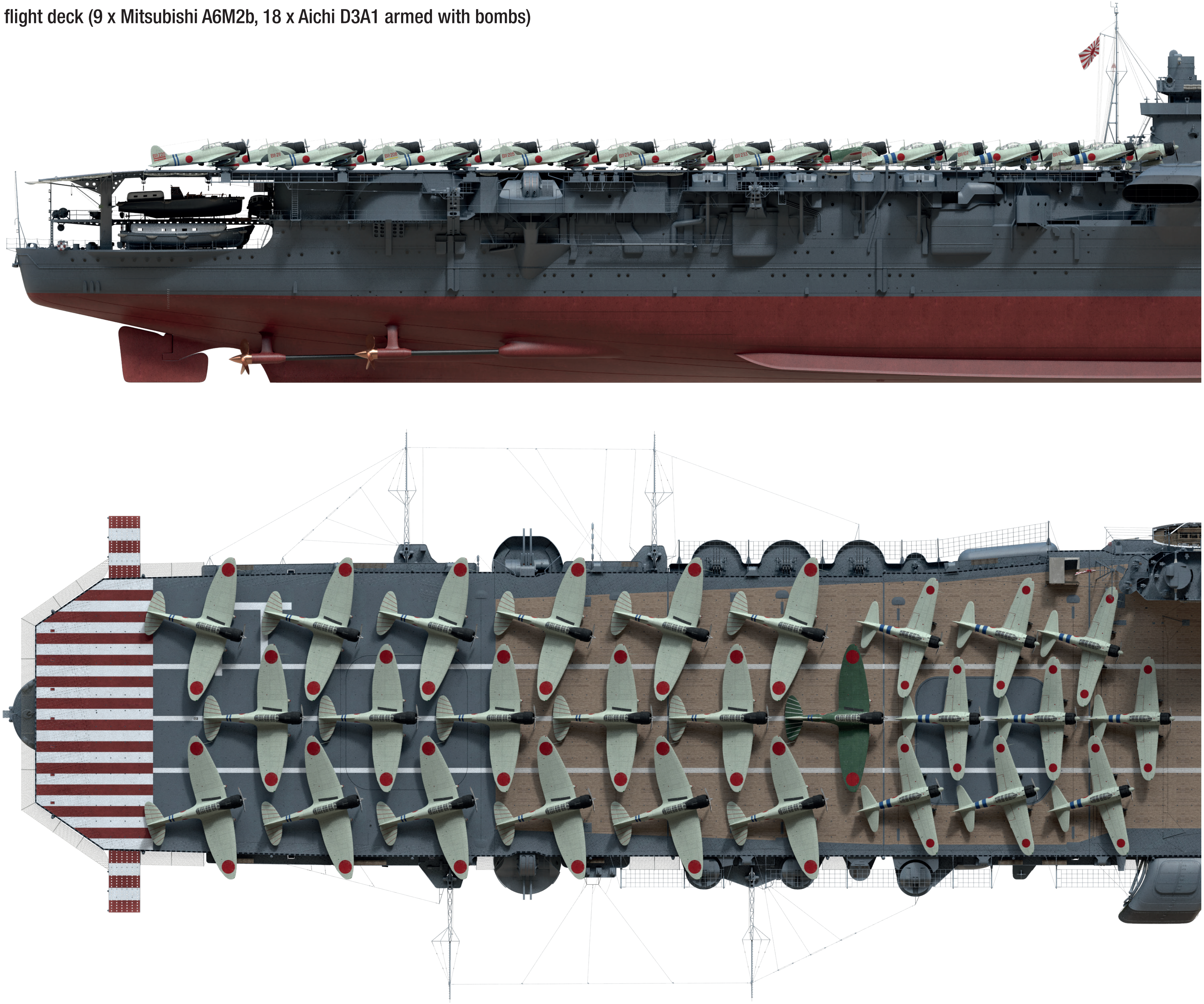
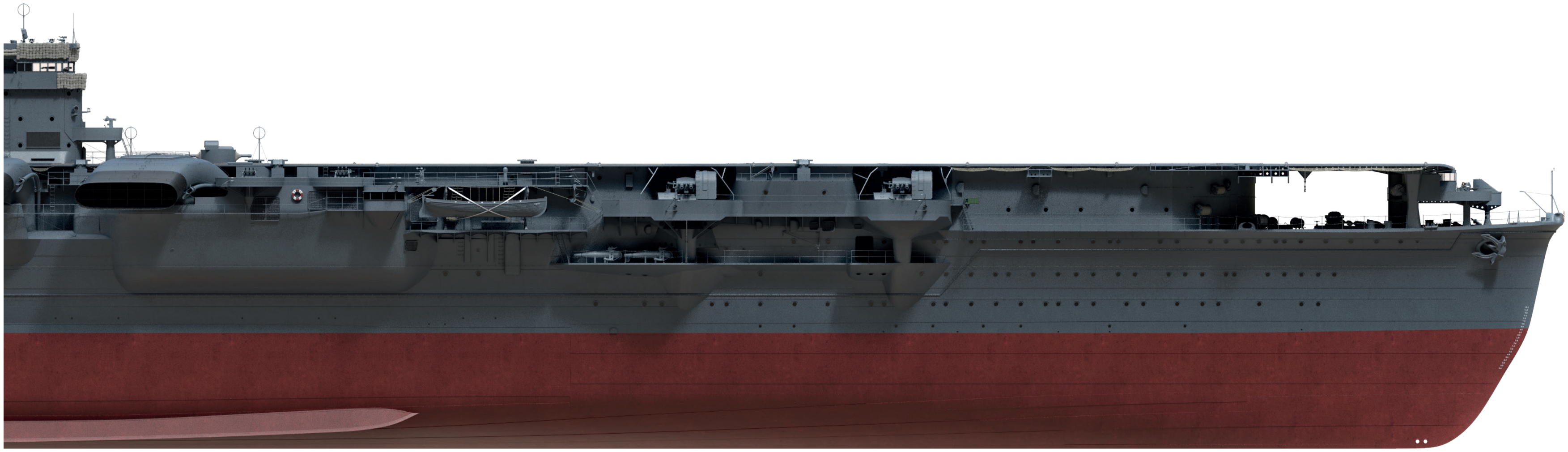
7 DECEMBER 1941, first wave of attack on Pearl Harbor spotted on the flight deck

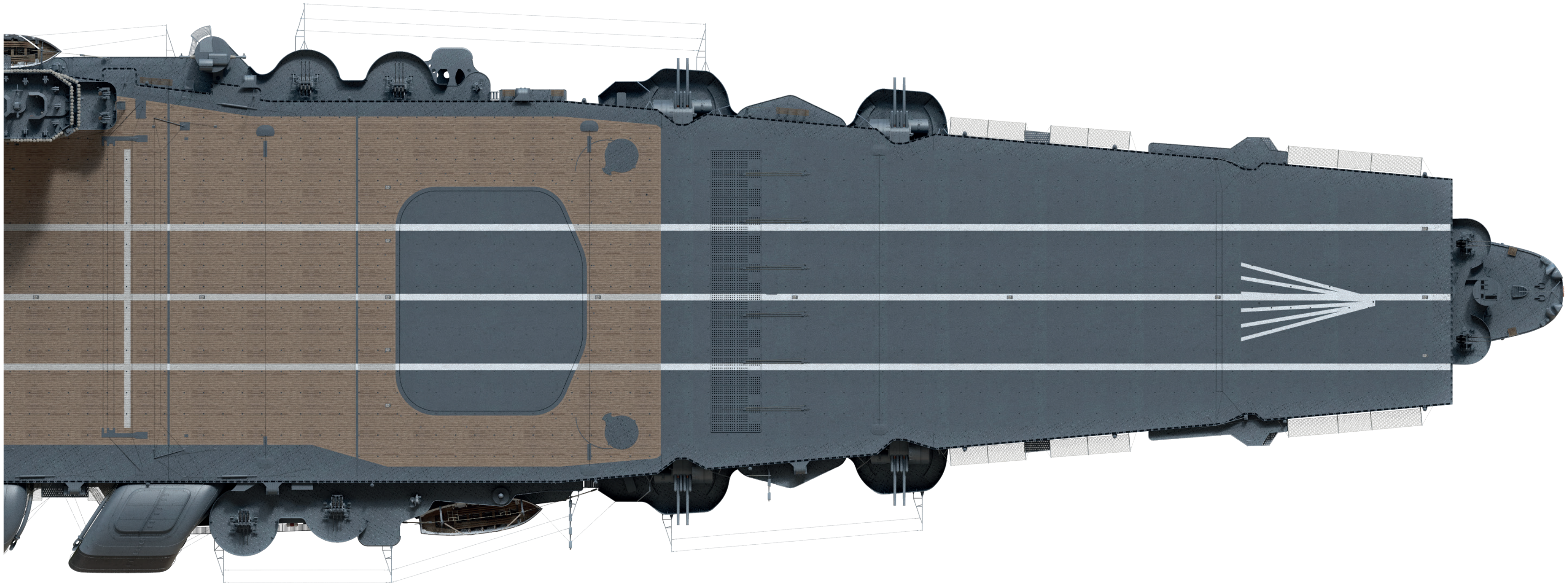




7 DECEMBER 1941, second wave of attack on Pearl Harbor spotted on the flight deck (9 x Mitsubishi A6M2b, 18 x Aichi D3A1 armed with bombs)

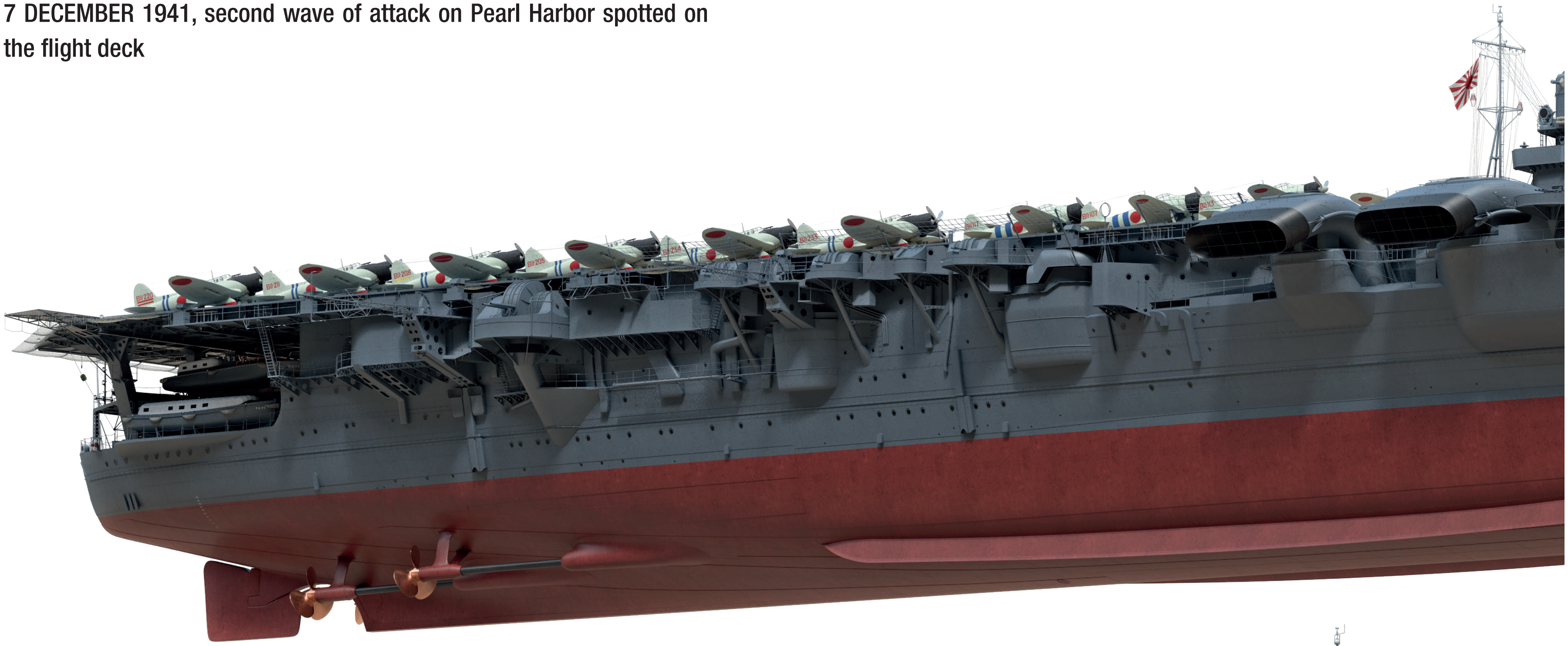


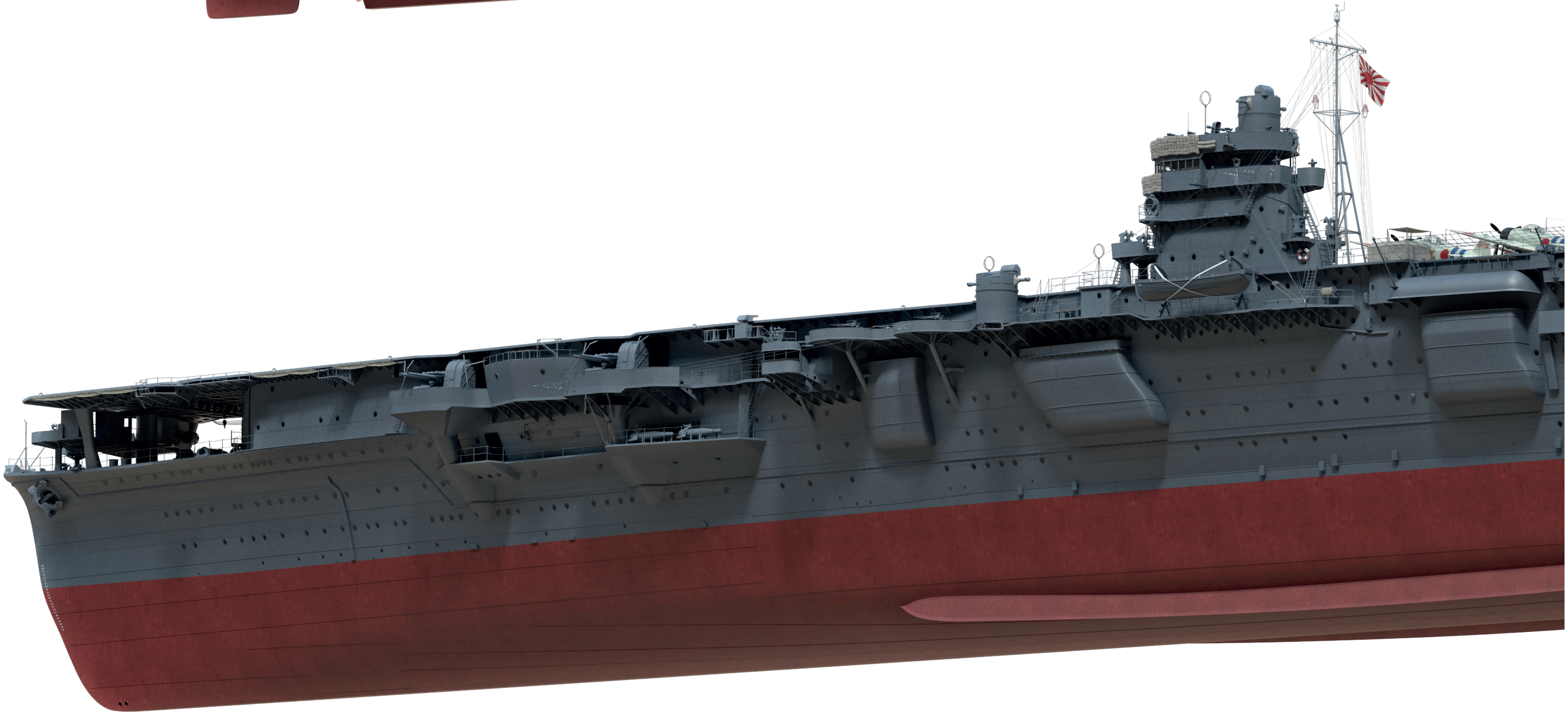


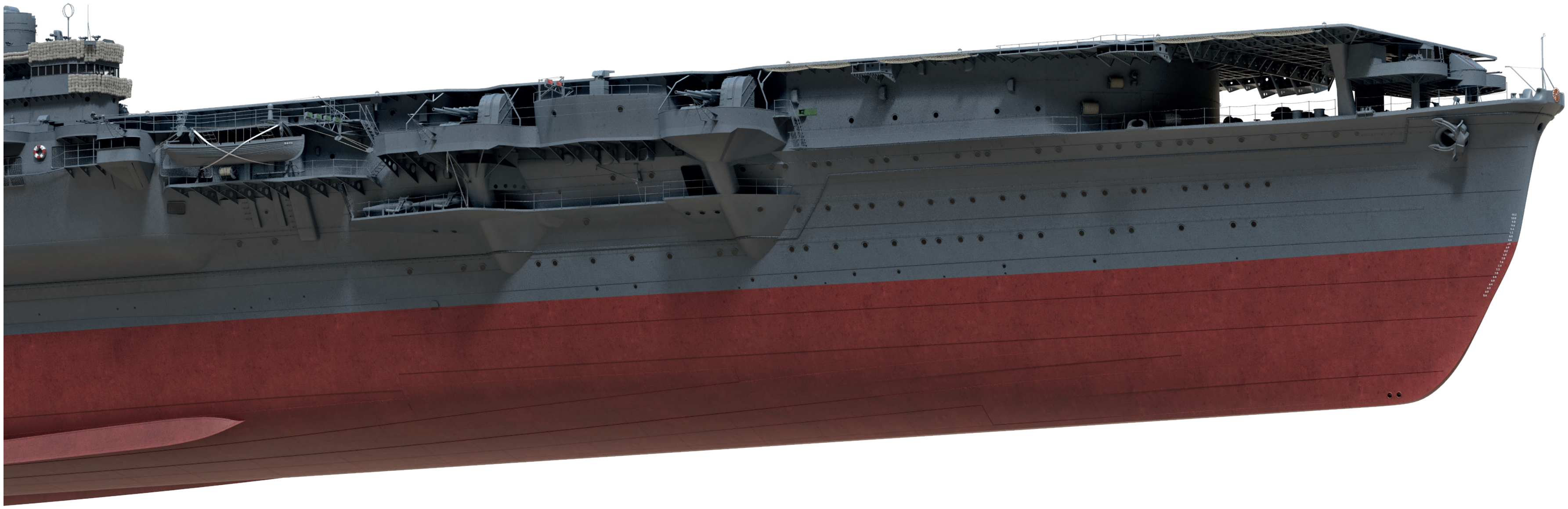


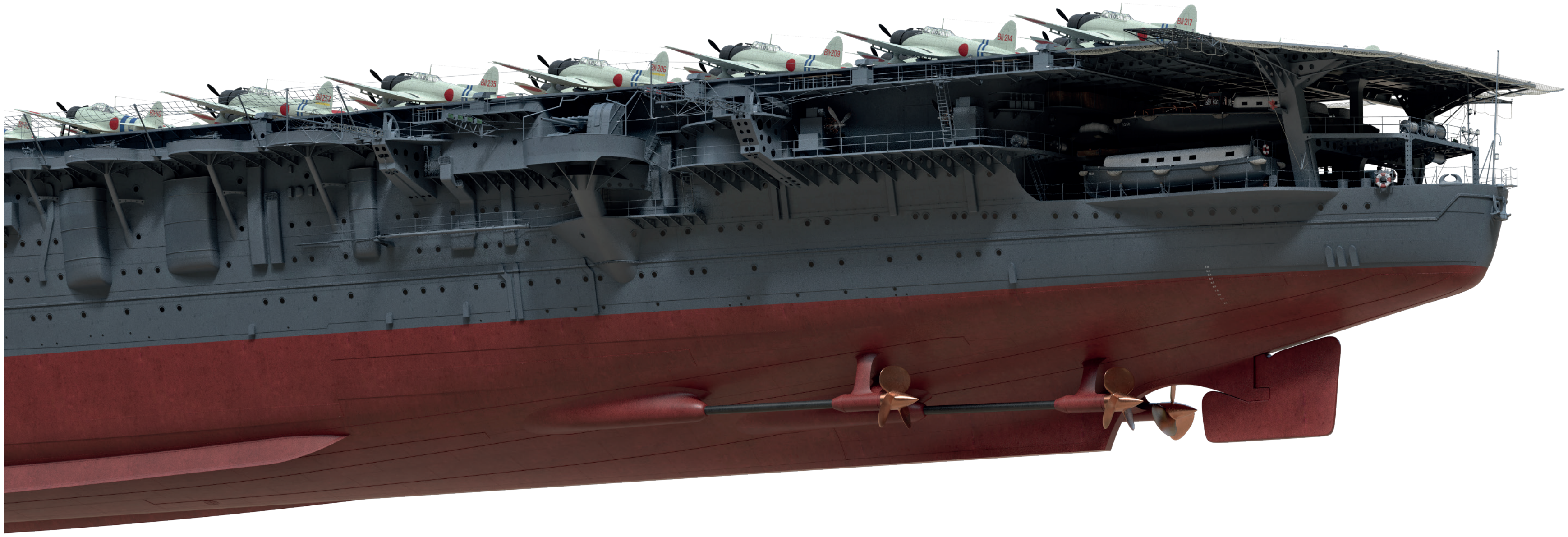
PRIMARY VIEWS

7 DECEMBER 1941, second wave of attack on Pearl Harbor spotted on the flight deck

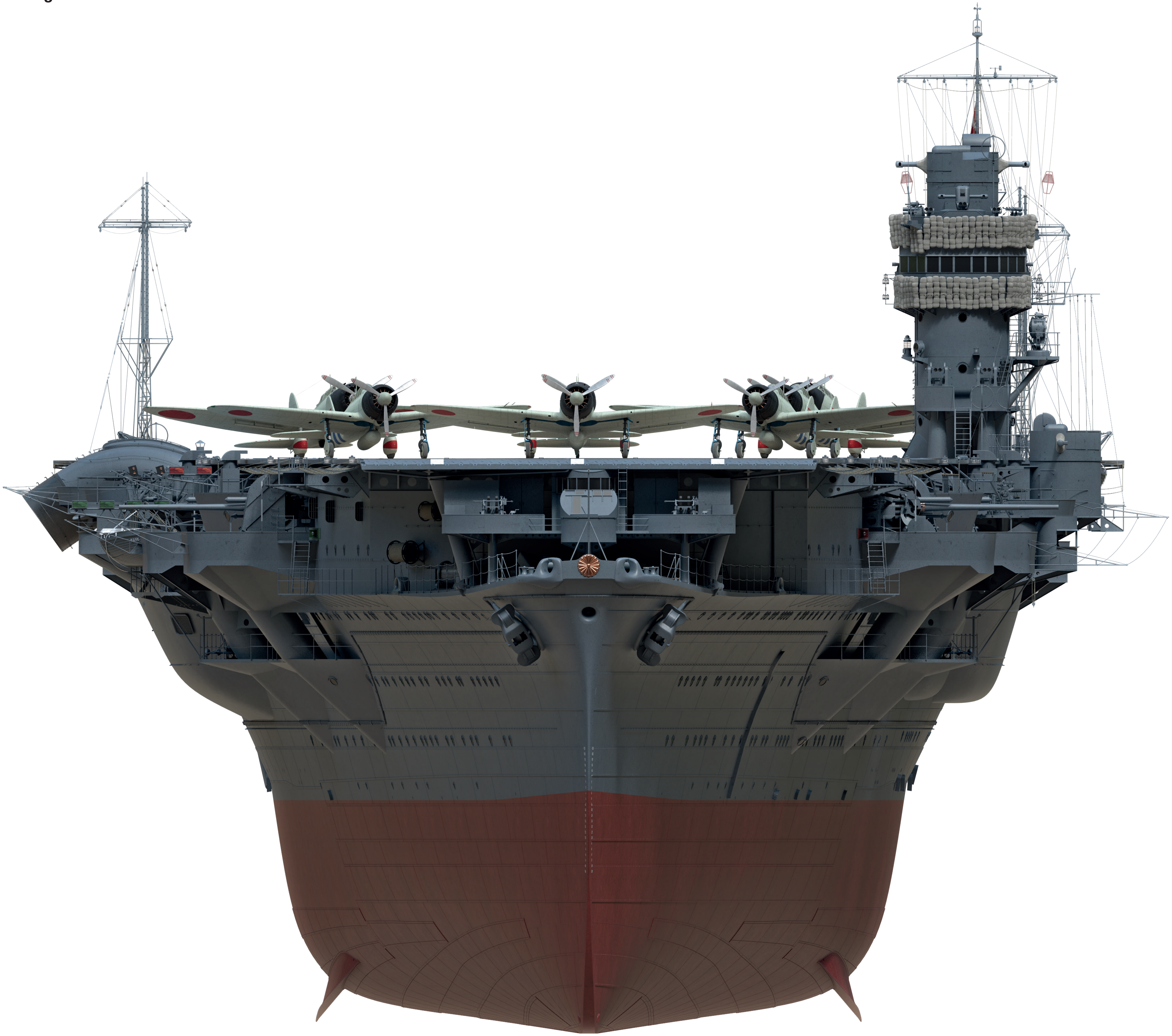


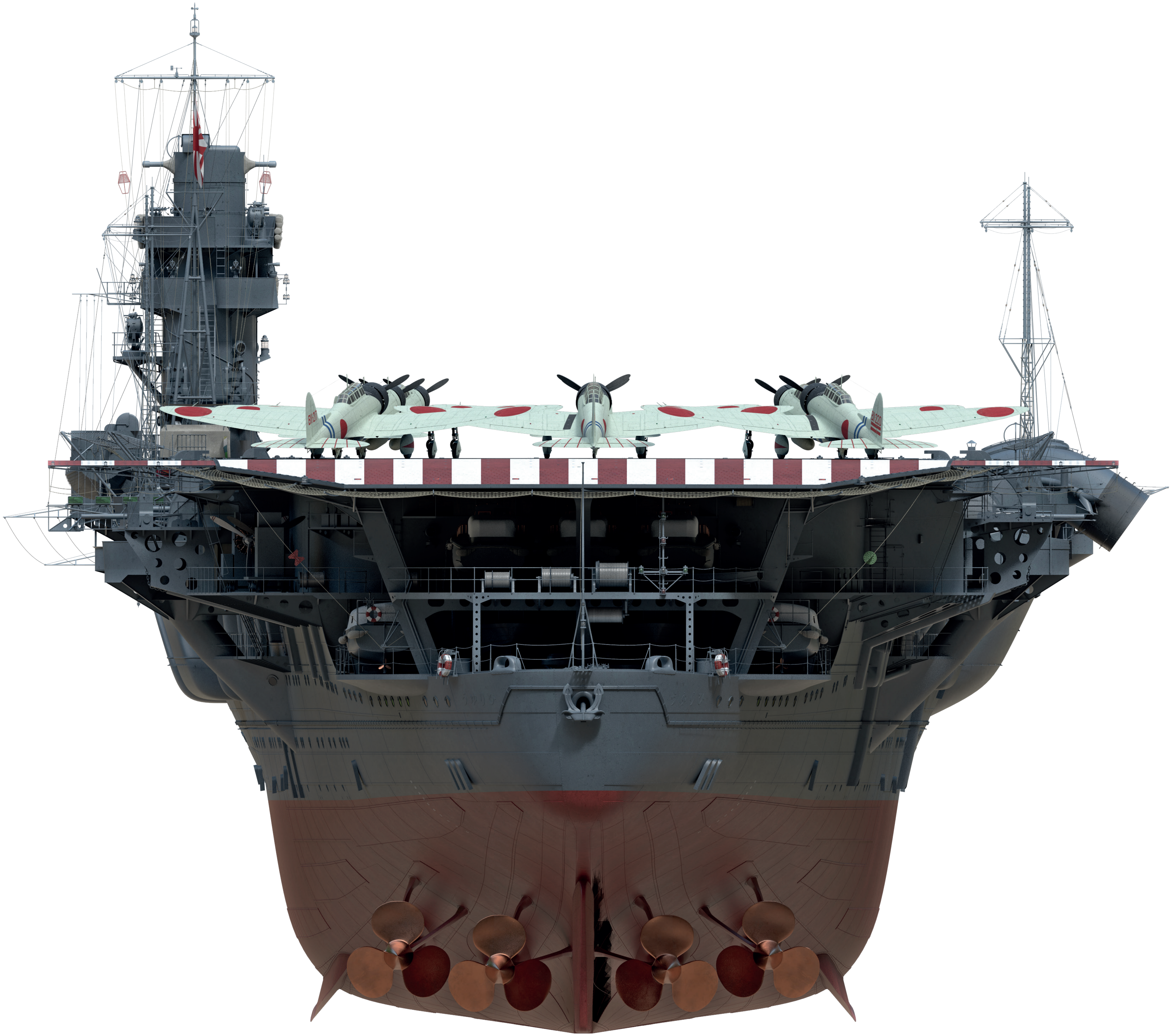






7 DECEMBER 1941, second wave of attack on Pearl Harbor spotted on the flight deck





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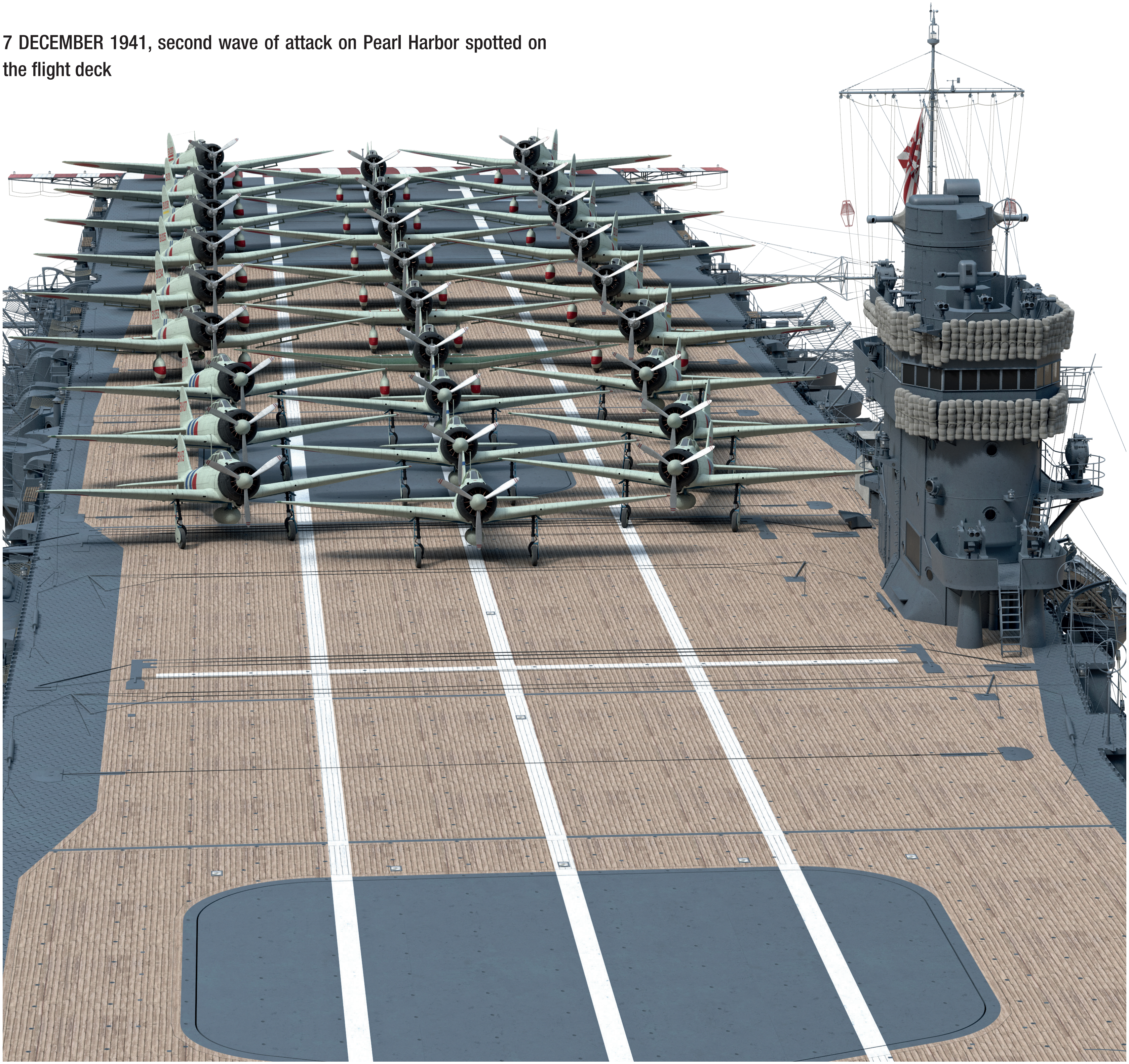
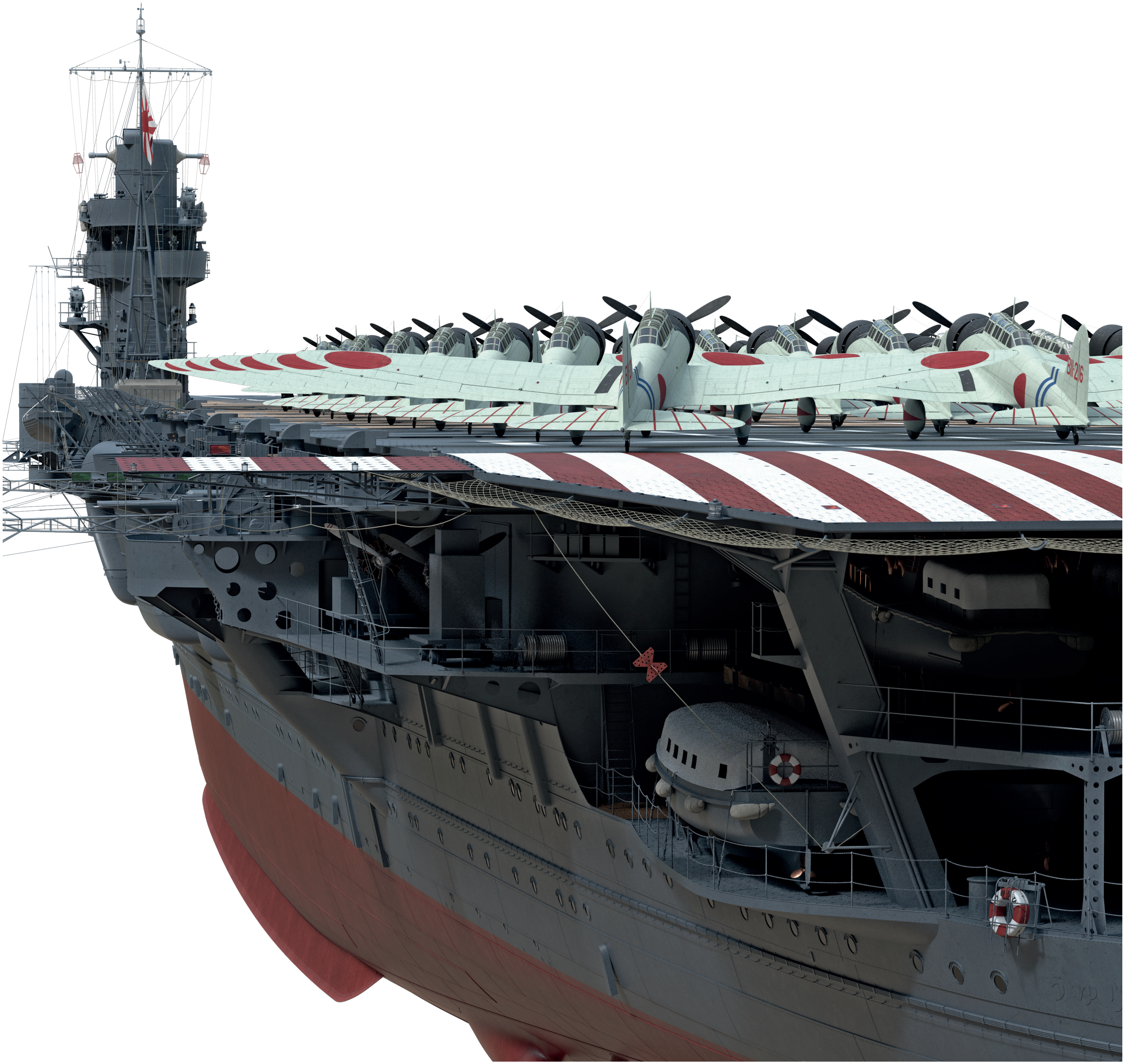
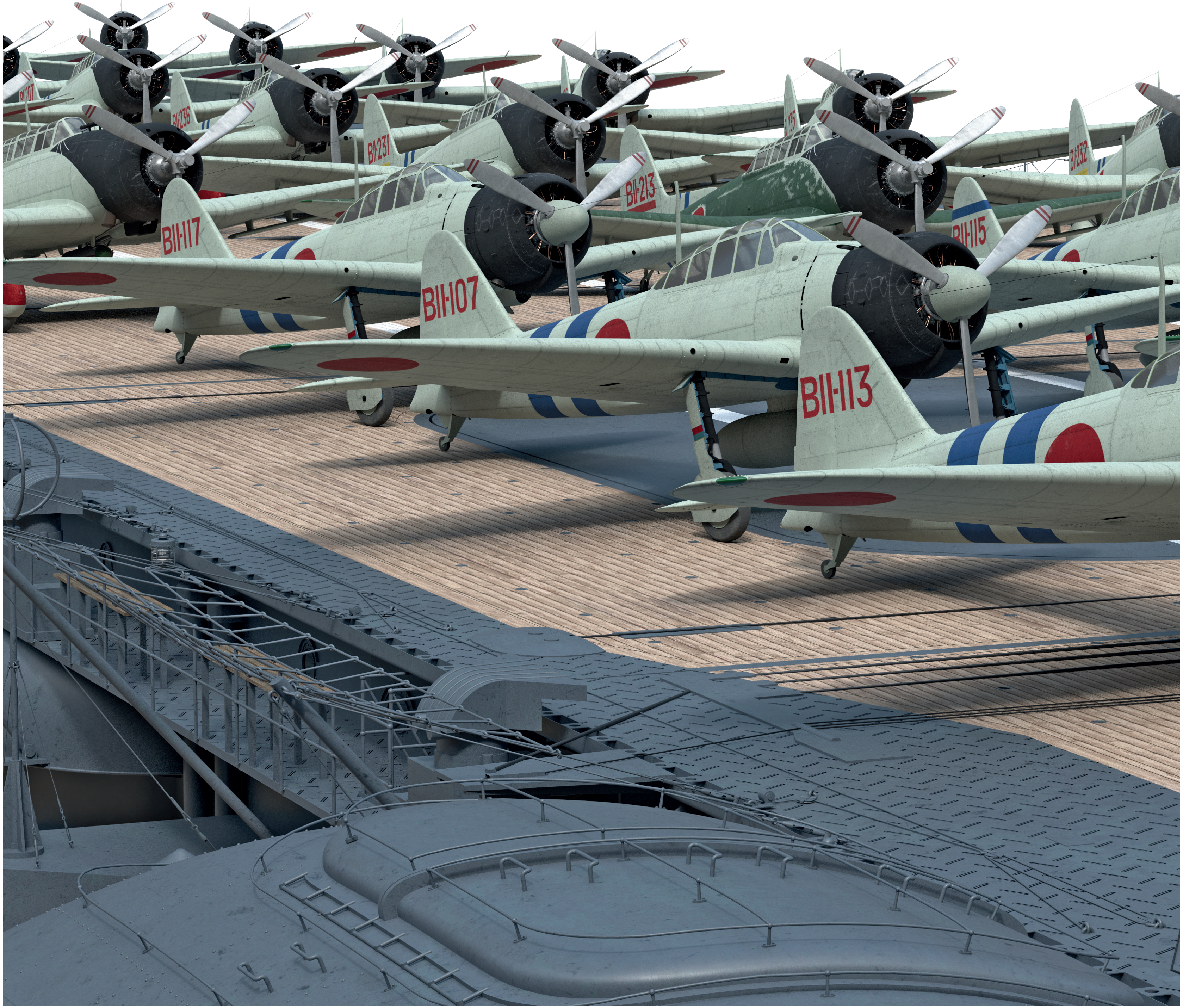



BII-216

7 DECEMBER 1941, second wave of attack on Pearl Harbor spotted on the flight deck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BII-213
BII-107
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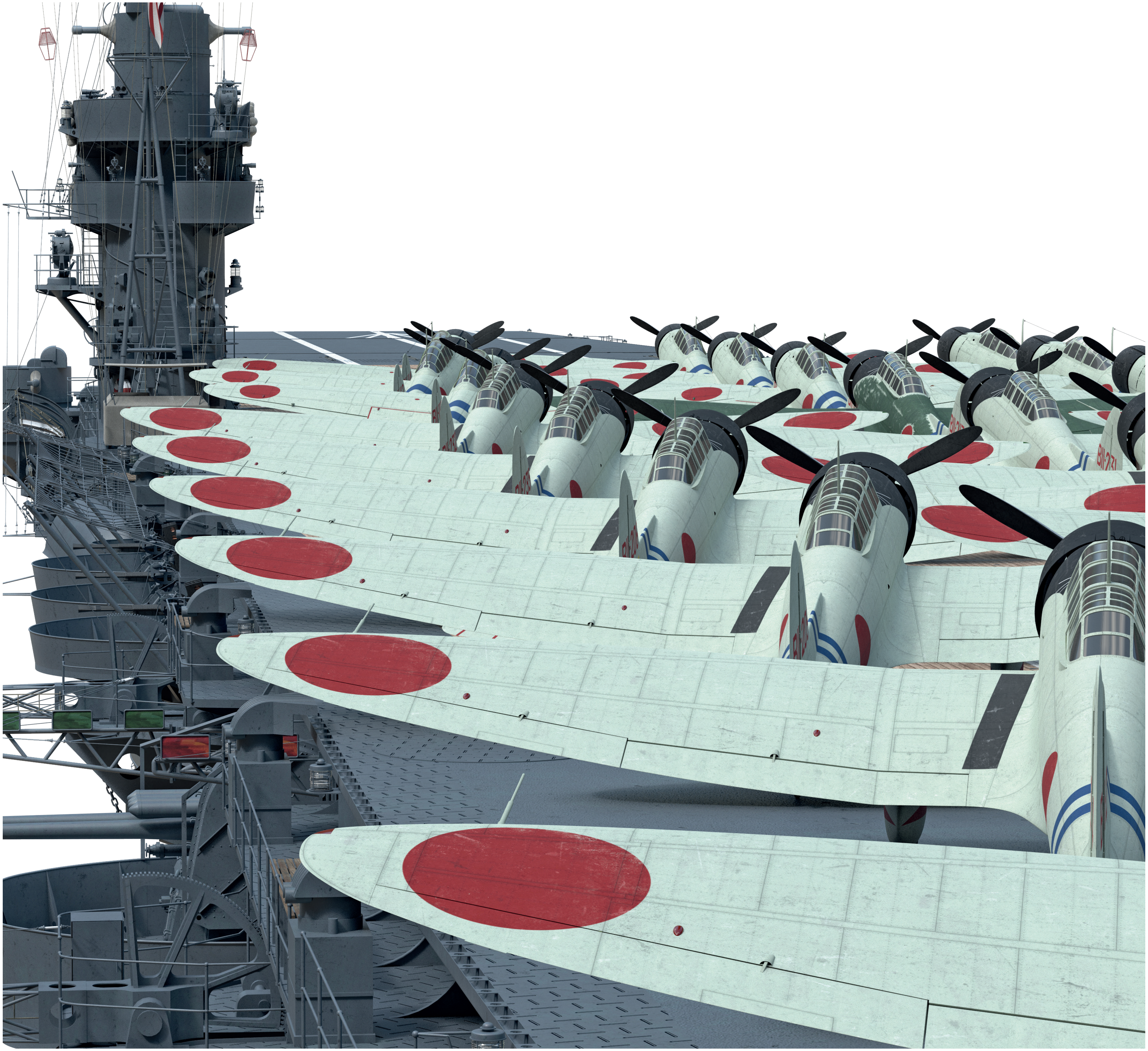
BII-232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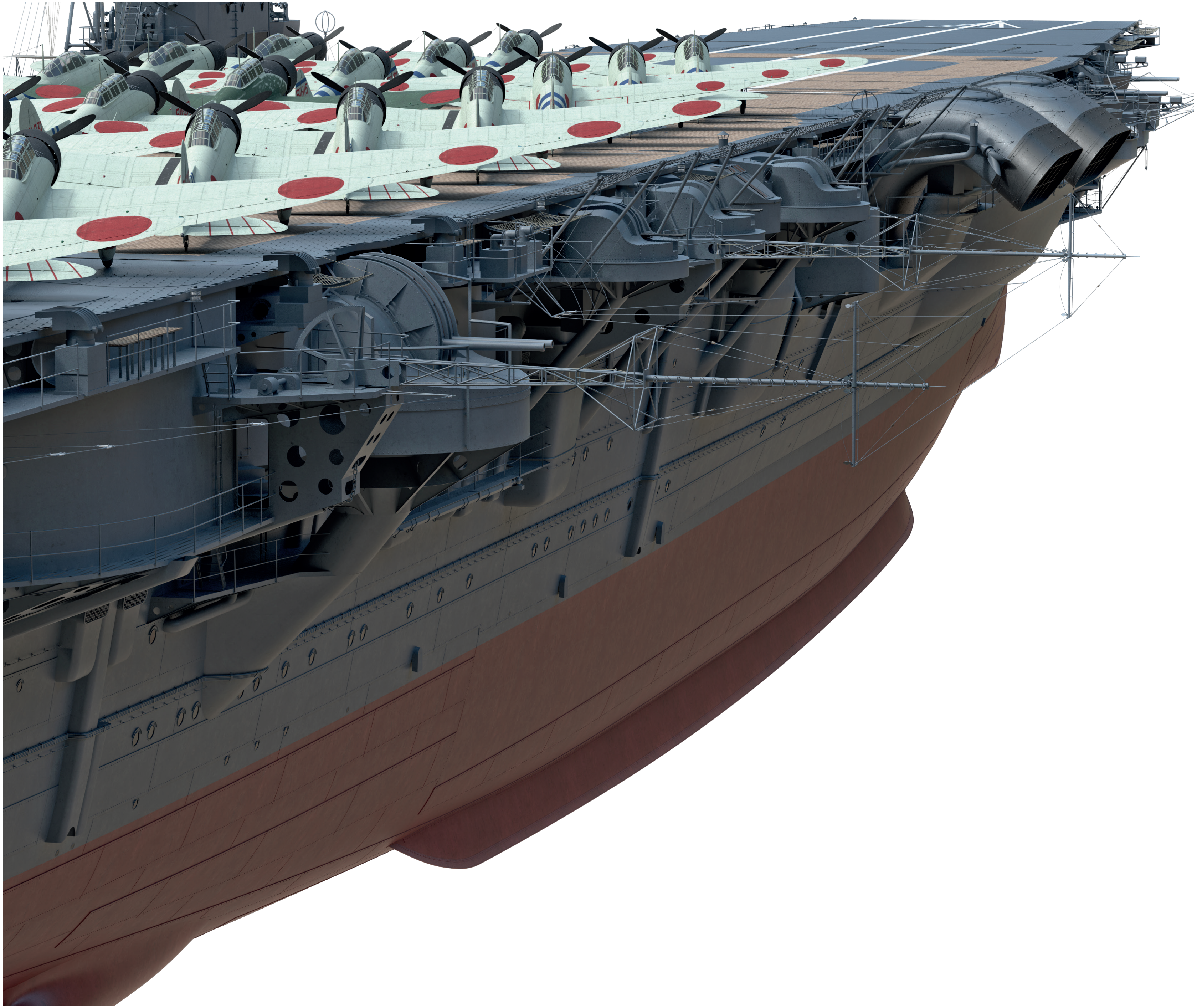
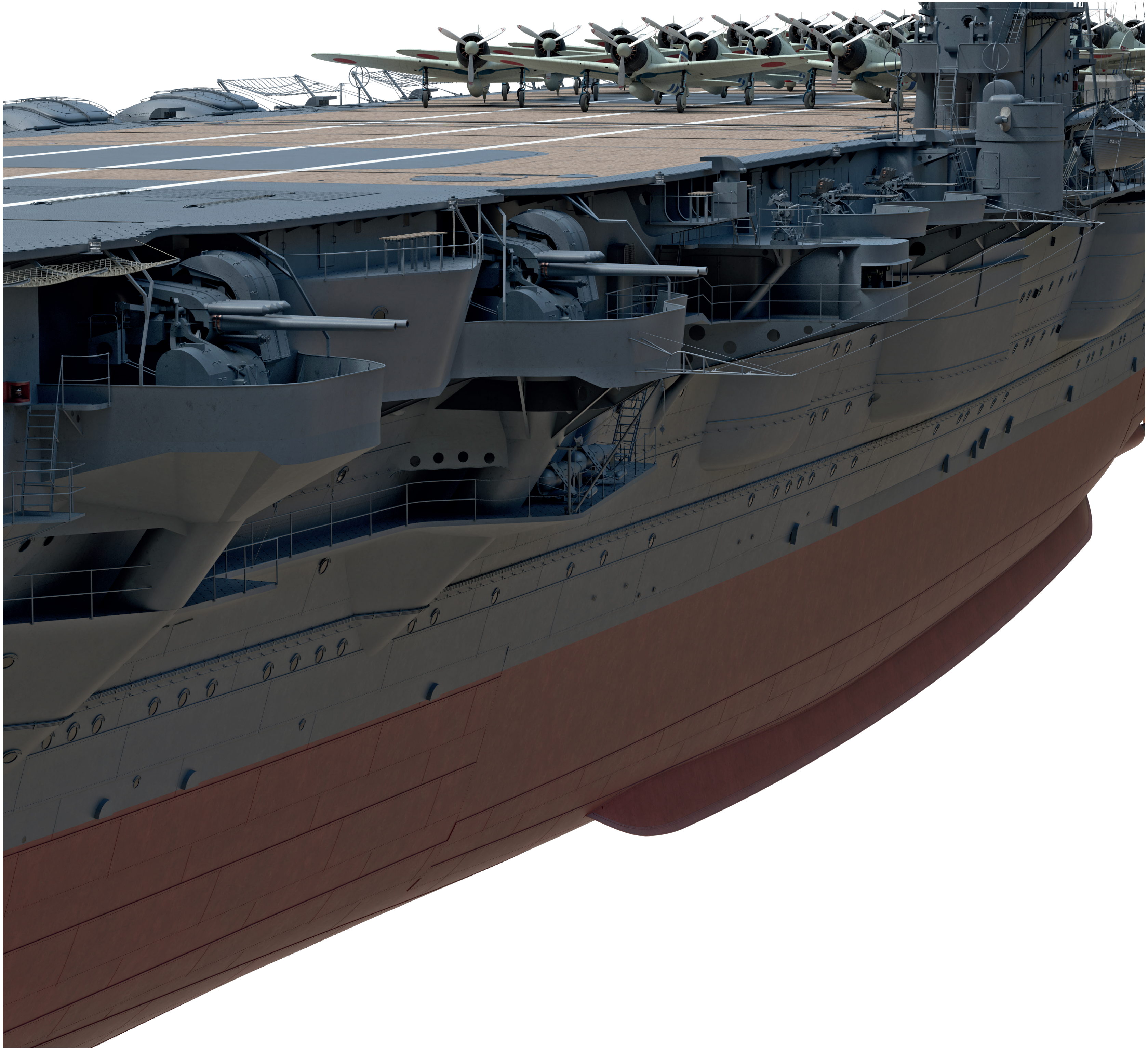
7 DECEMBER 1941, second wave of attack on Pearl Harbor spotted on the flight deck





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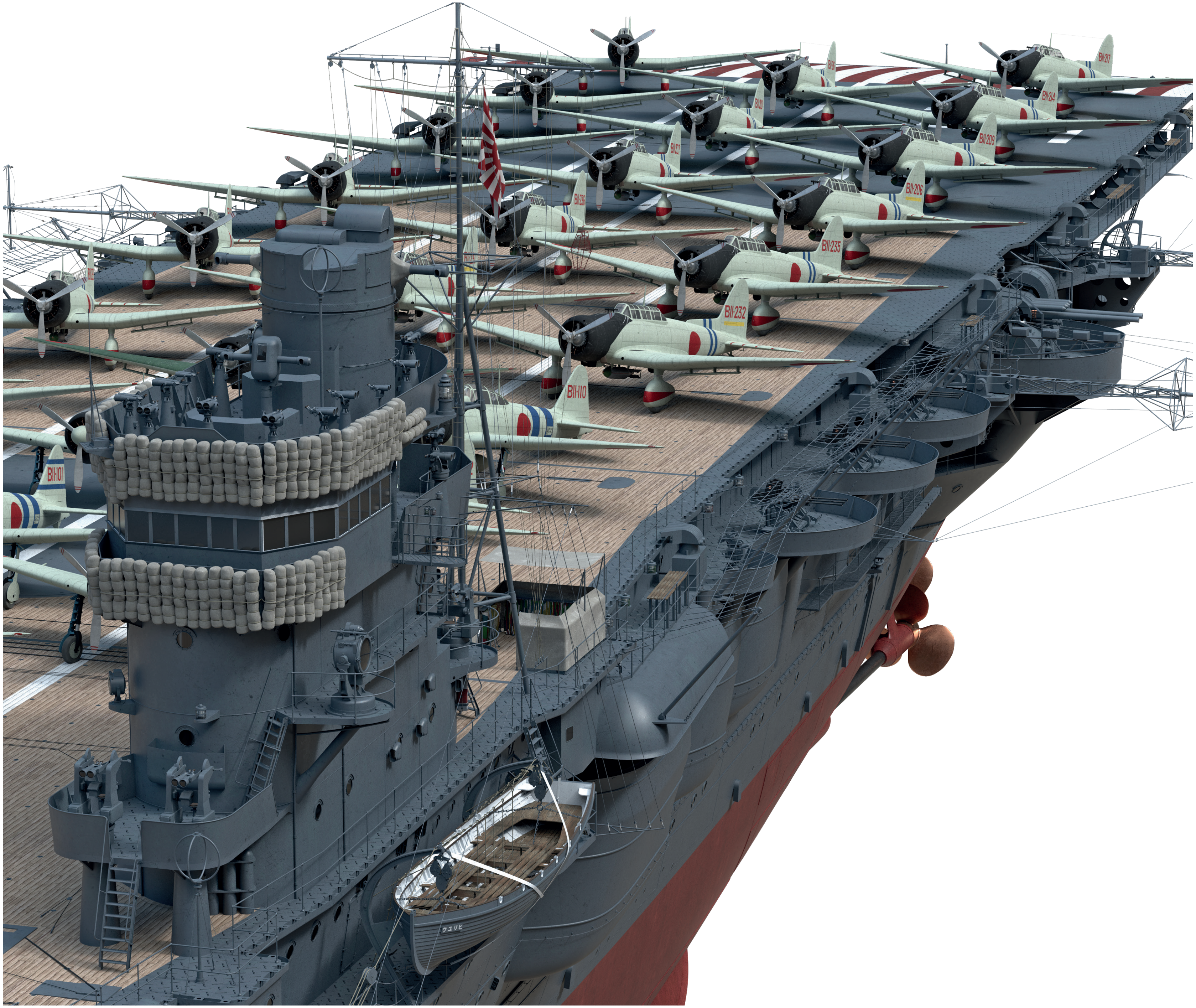
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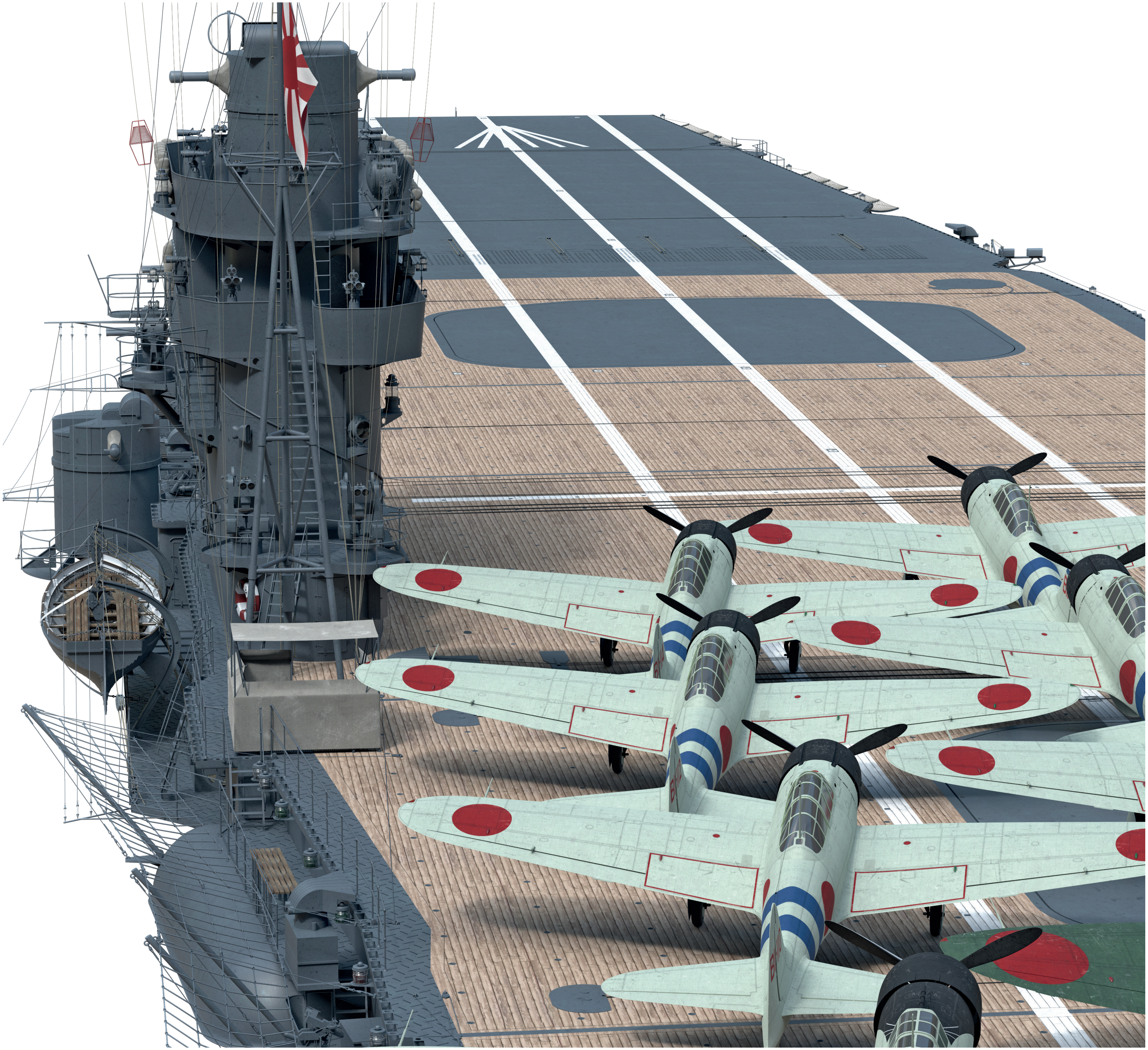

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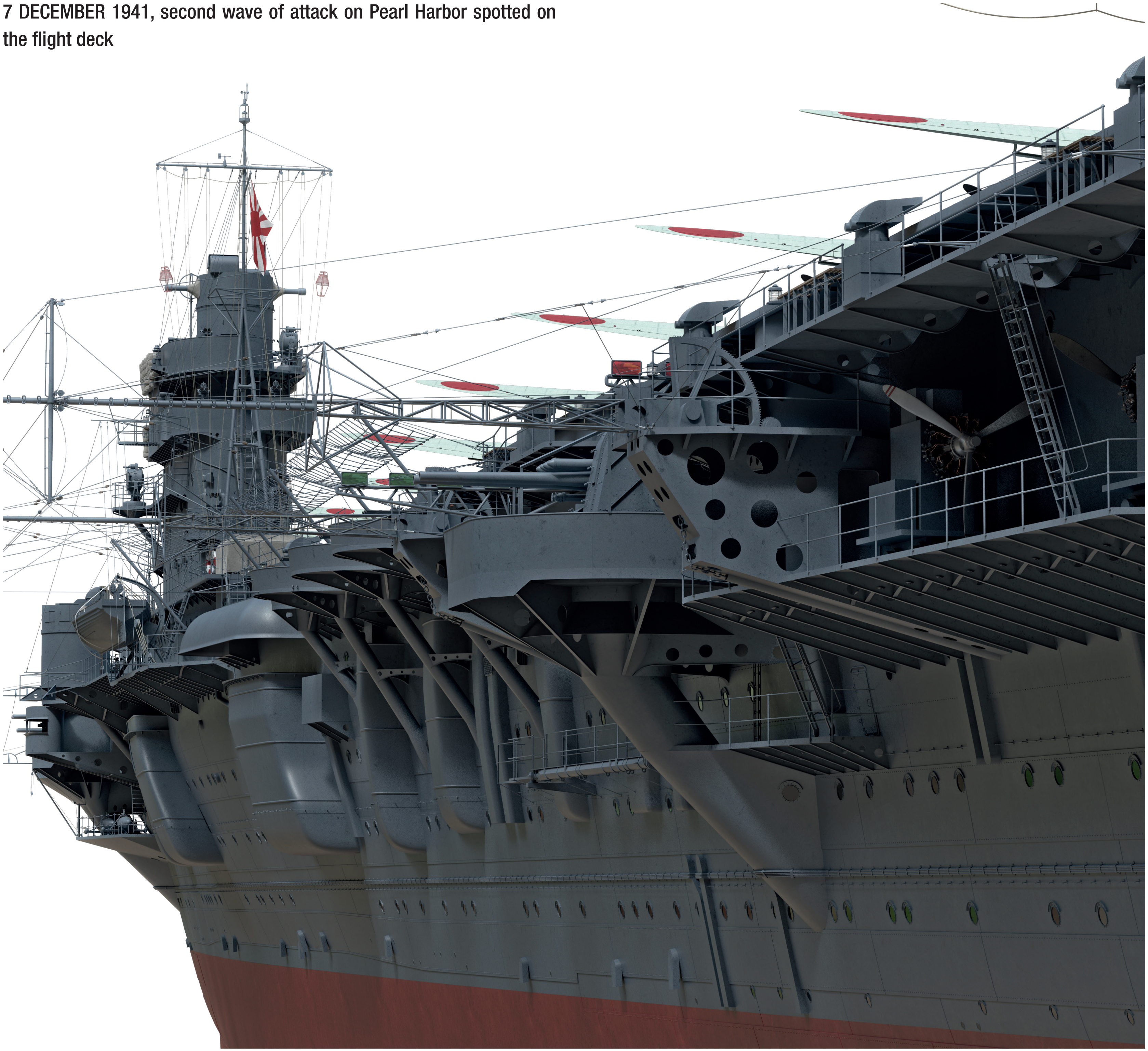

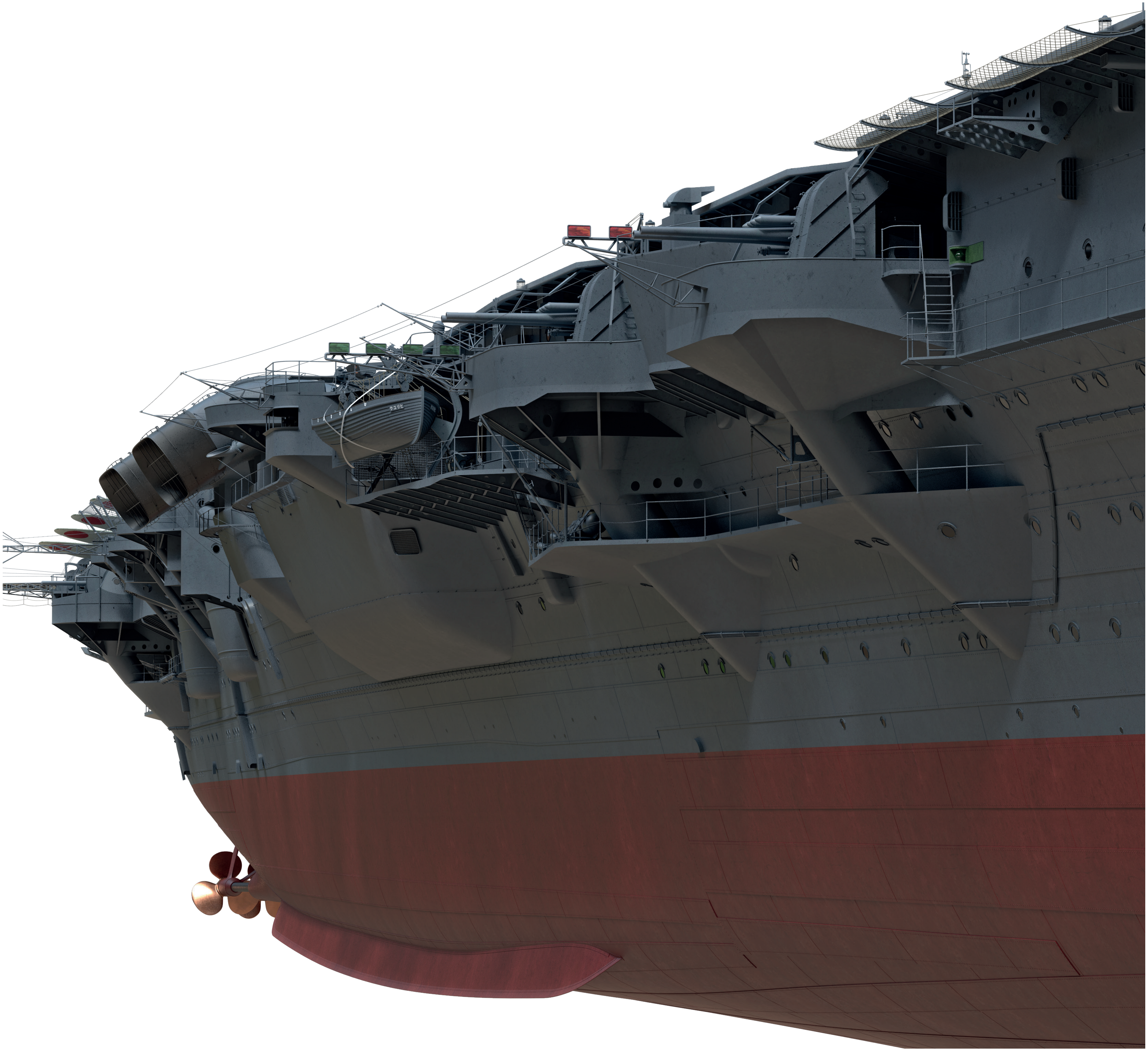
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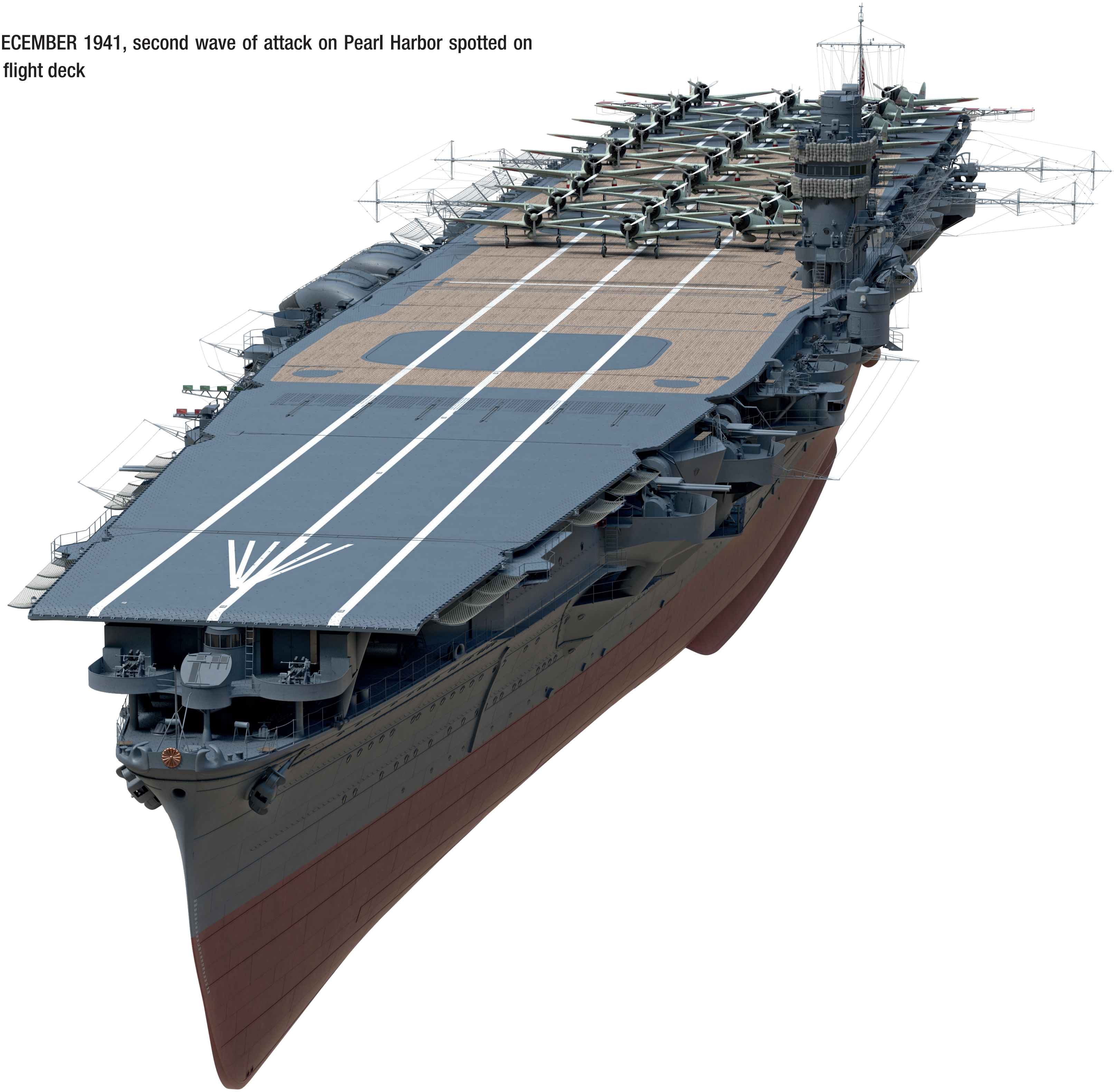
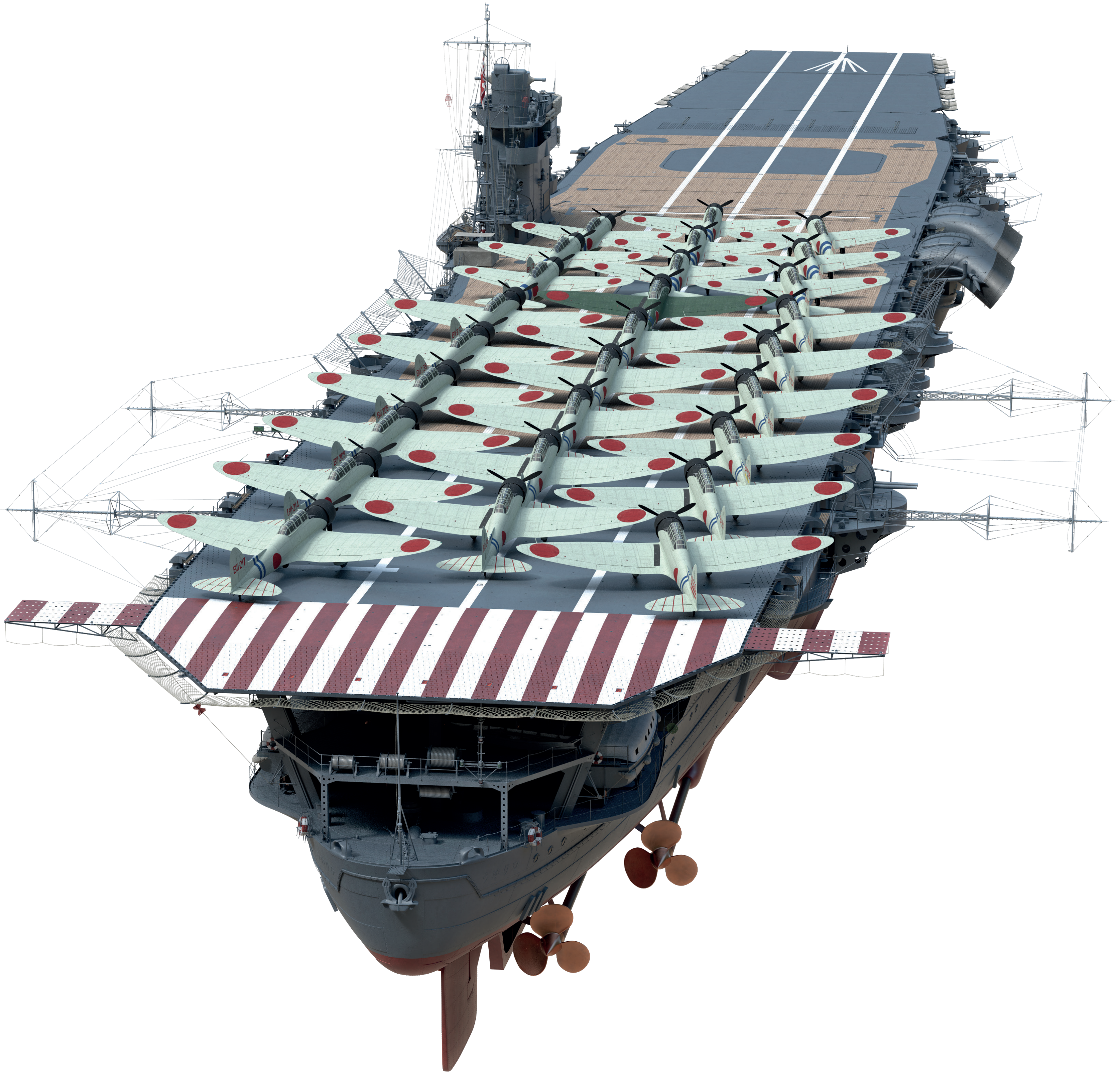
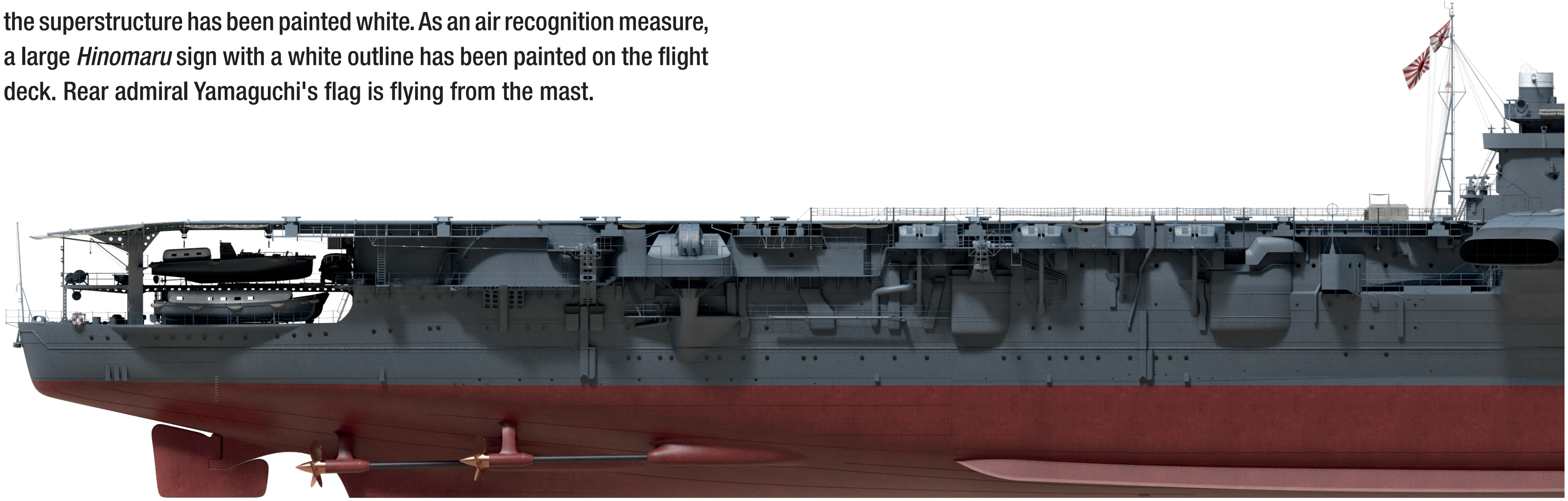
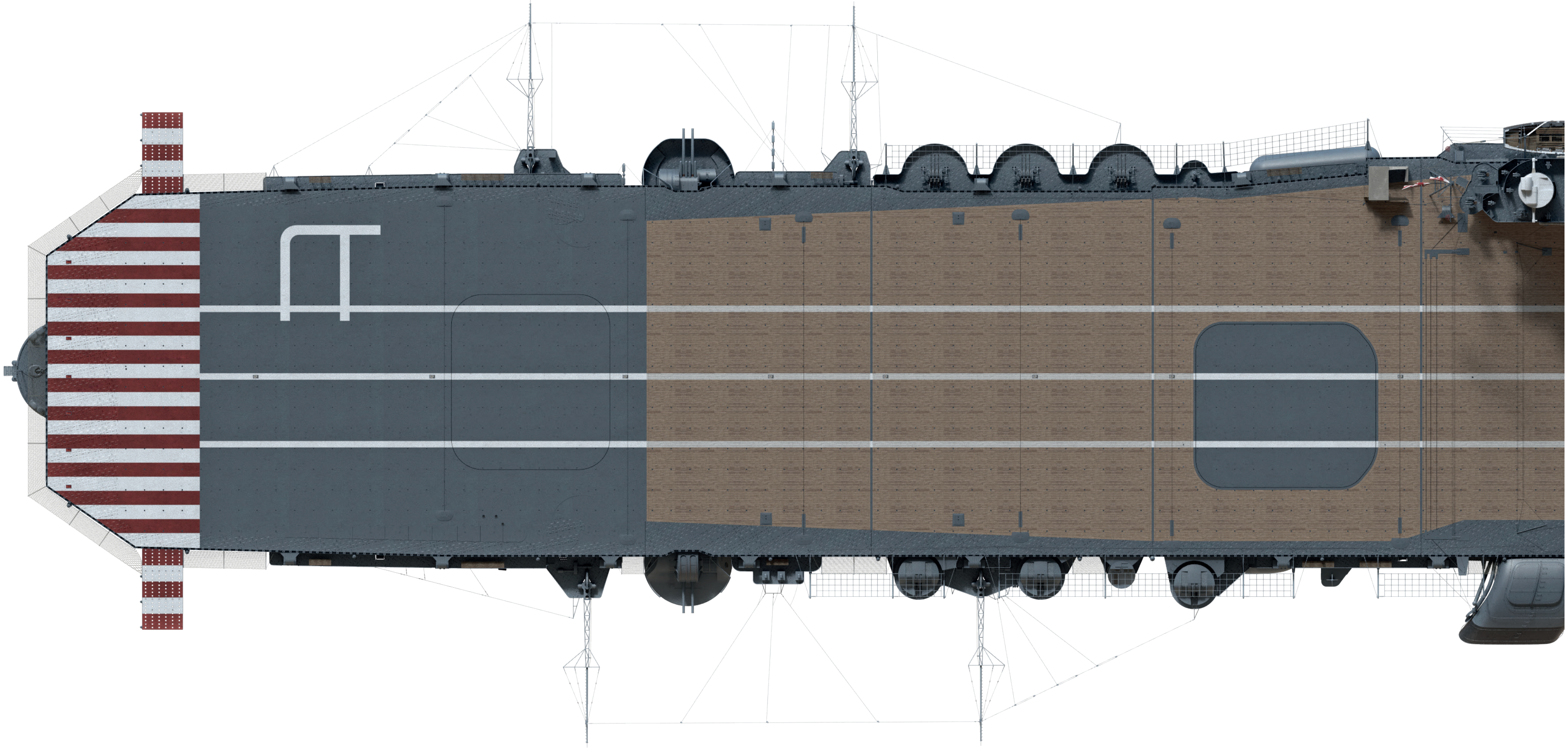
7 DECEMBER 1941, second wave of attack on Pearl Harbor spotted on the flight deck

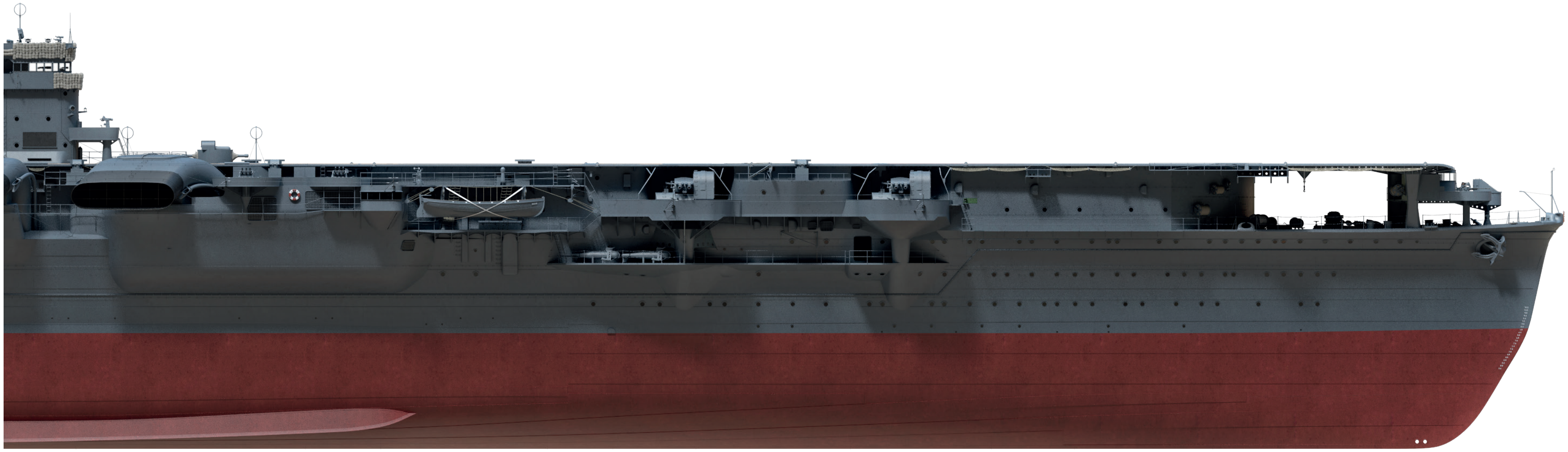


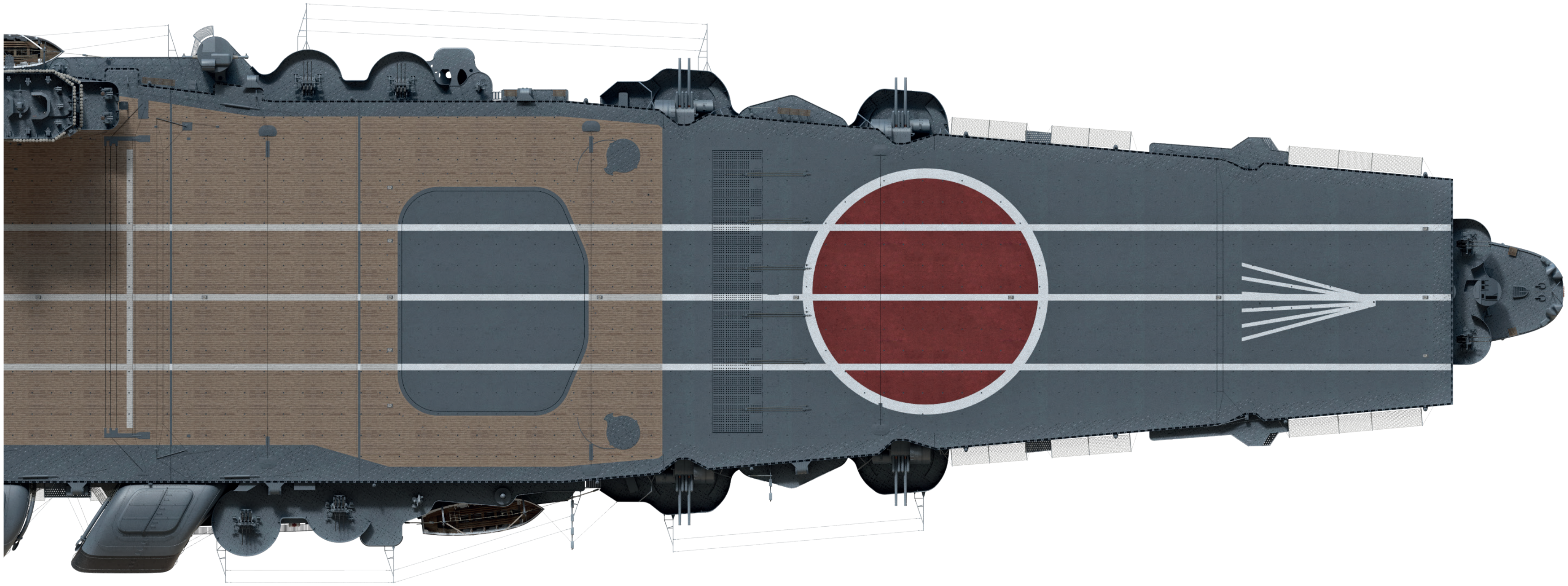


4 JUNE 1942, Battle of Midway. The gun director on top of the superstructure has been painted white. As an air recognition measure, a large *Hinomaru* sign with a white outline has been painted on the flight deck. Rear admiral Yamaguchi's flag is flying from the mast.

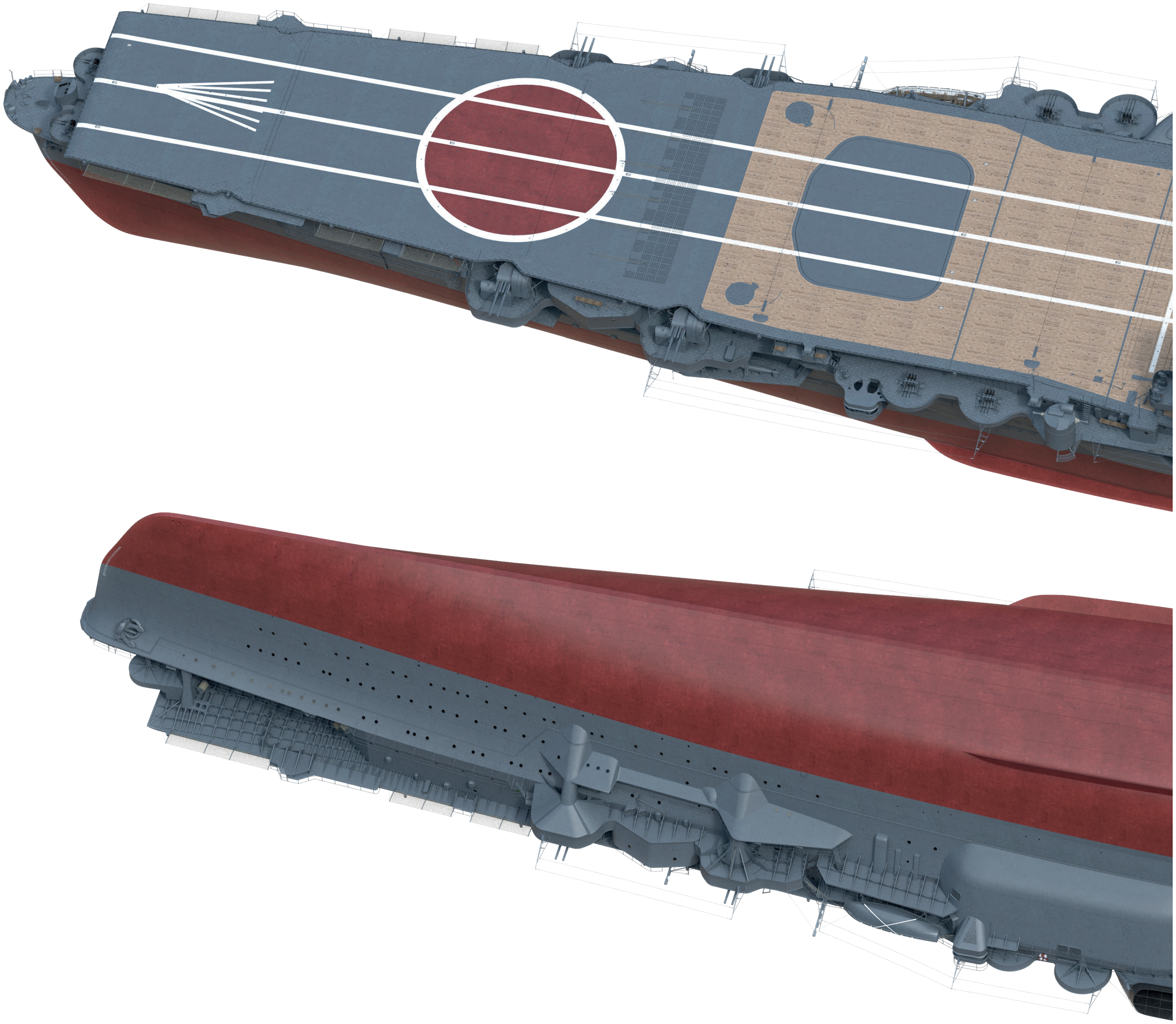


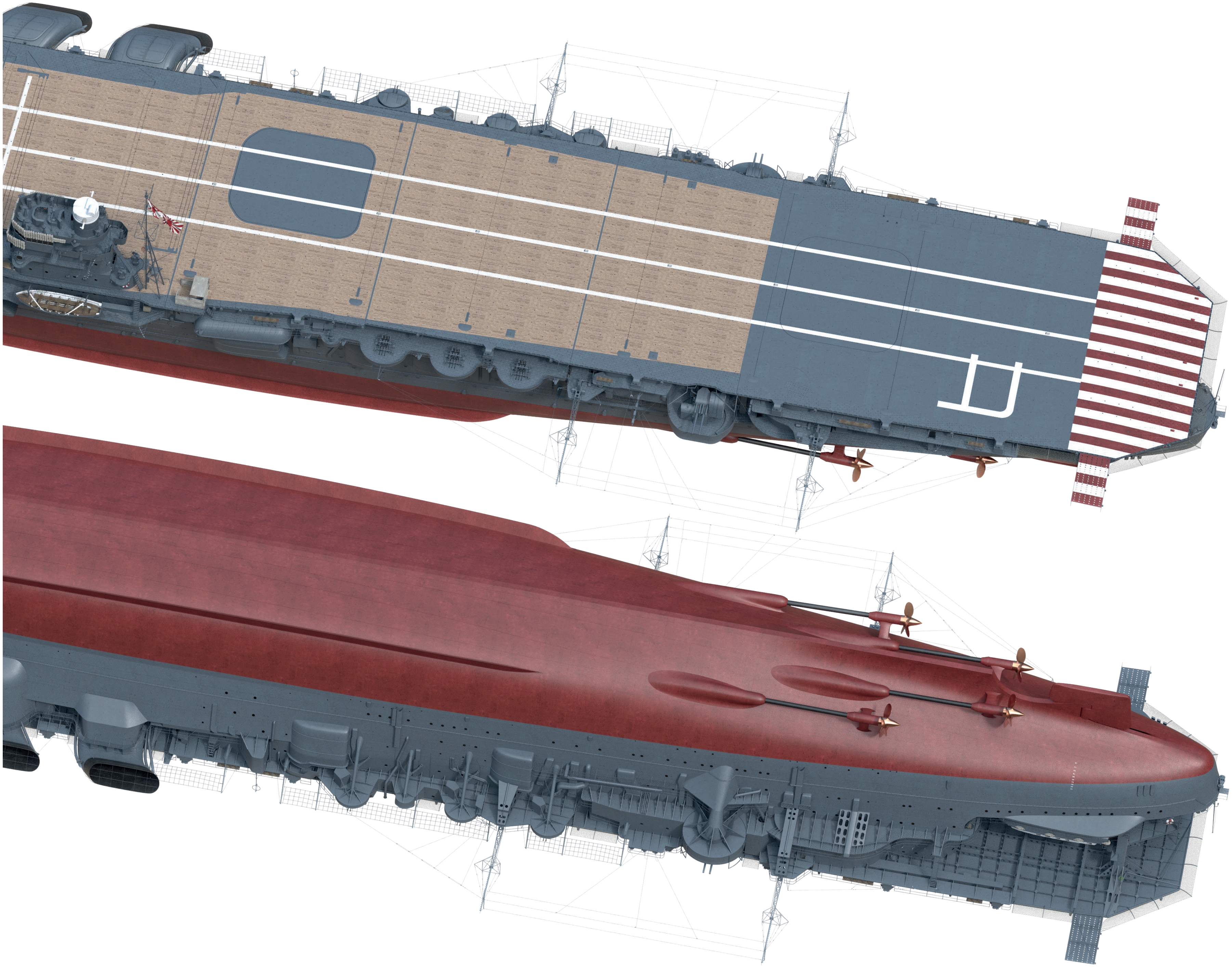






4 JUNE 1942, Battle of Midway

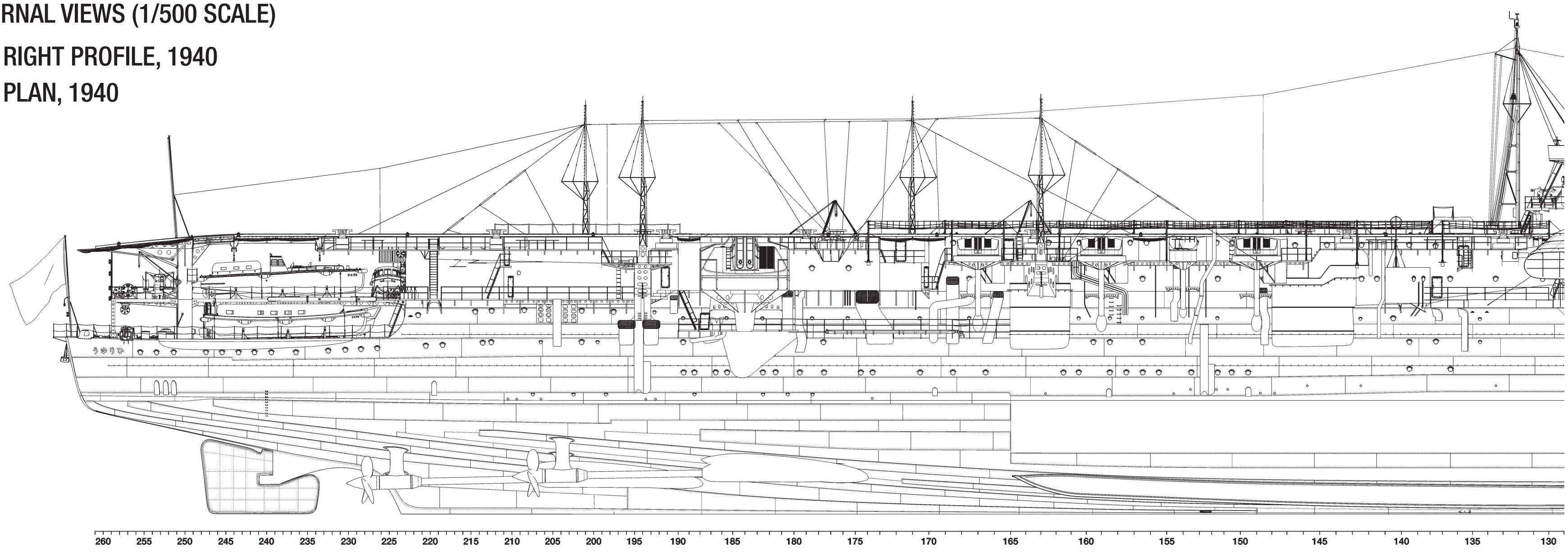




EXTERNAL VIEWS (1/500 SCALE)

A1/1 RIGHT PROFILE, 1940

A1/2 PLAN, 1940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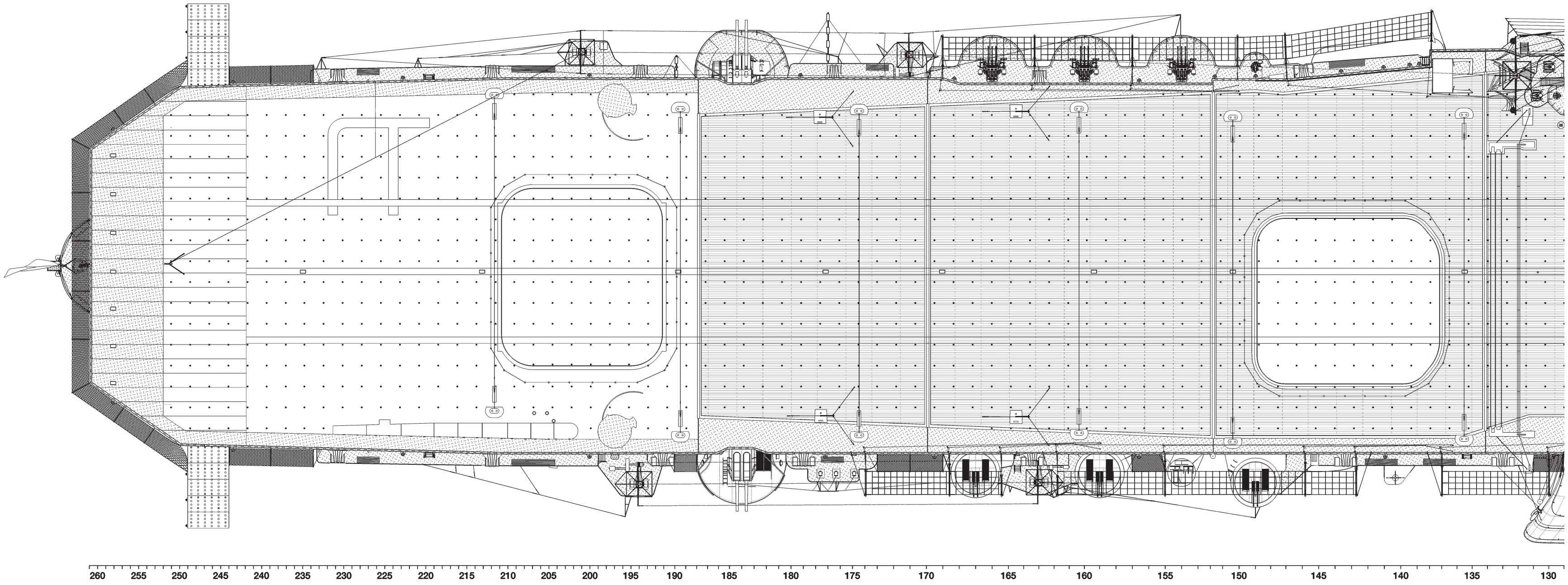
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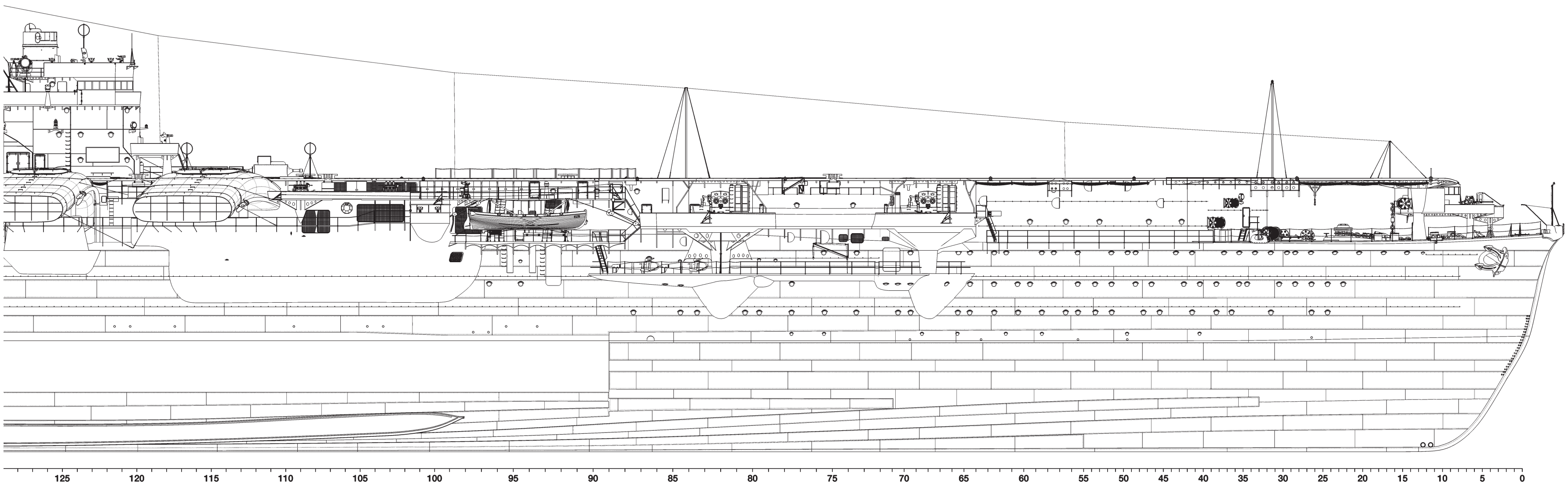
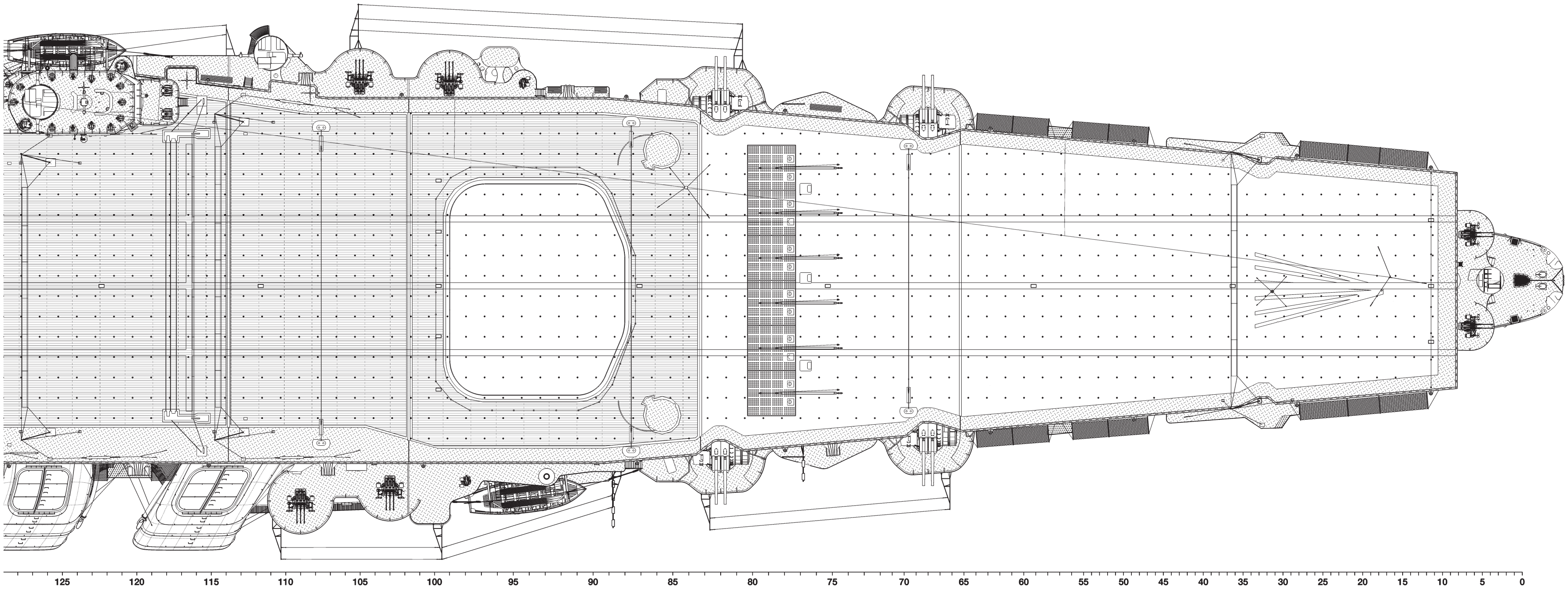


A1/1

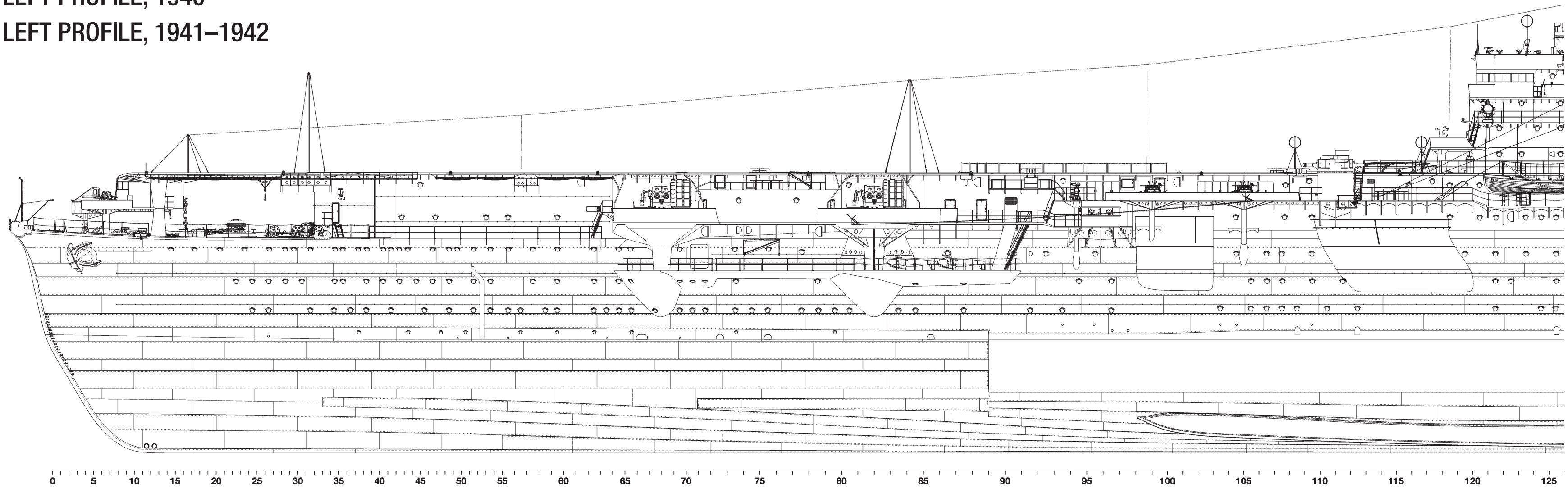


A1/2

EXTERNAL VIEWS (1/500 SCALE)

A1/3 LEFT PROFILE, 1940

A1/4 LEFT PROFILE, 1941–1942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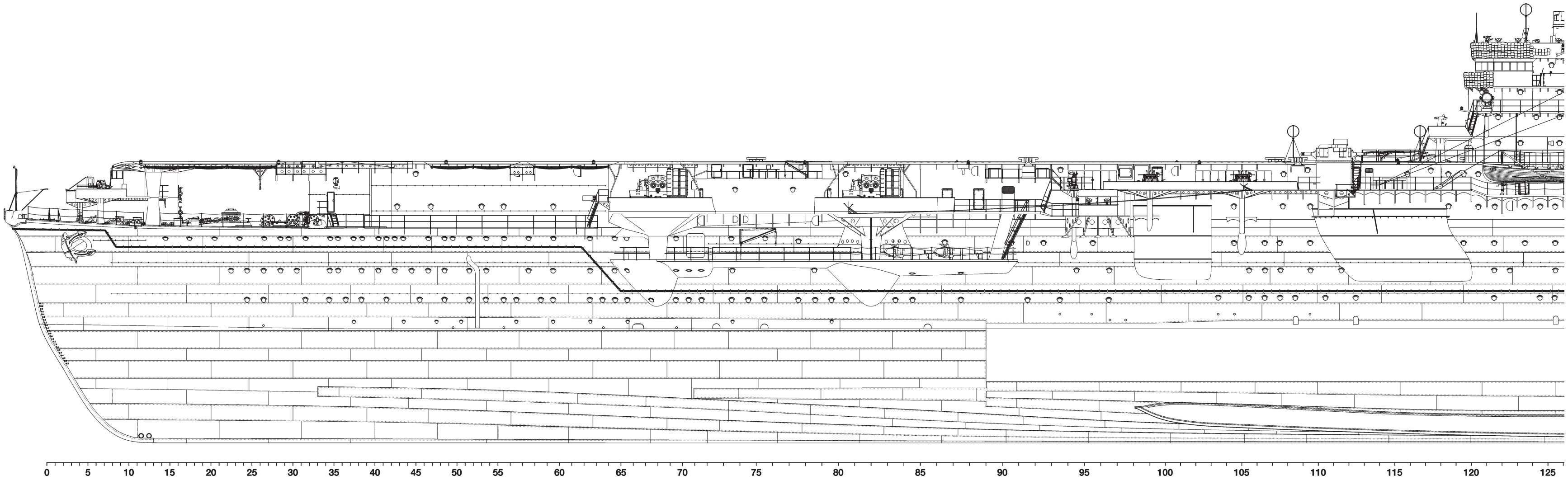
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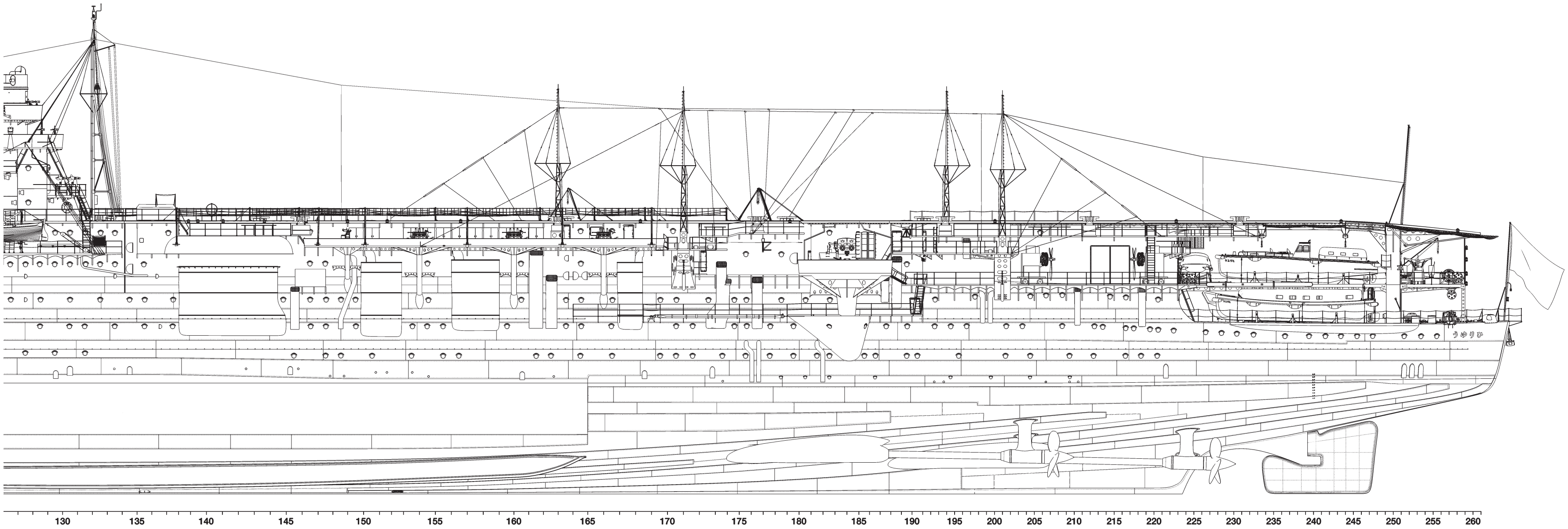
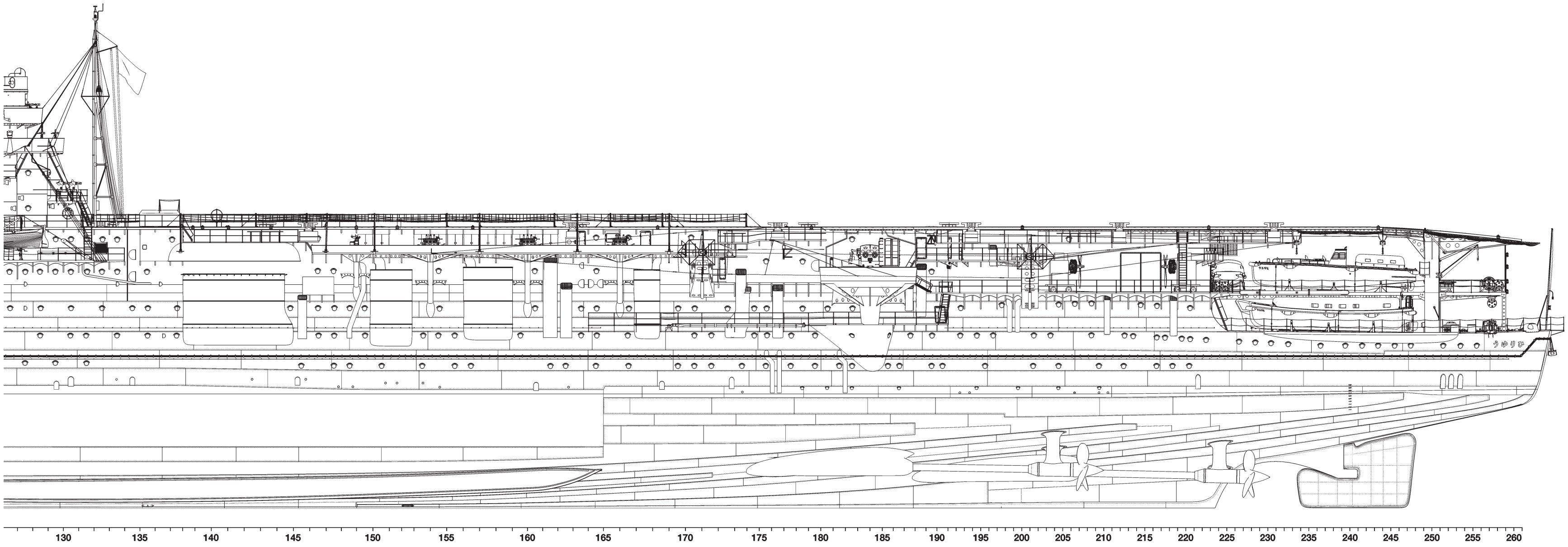


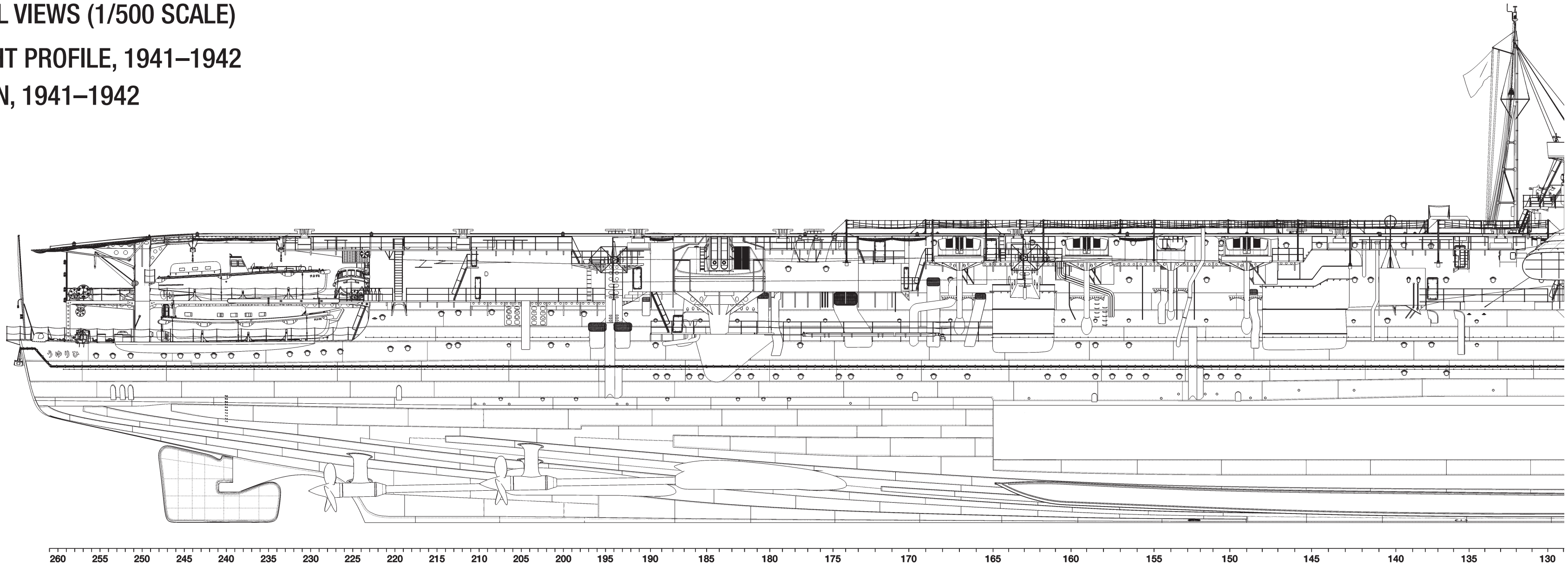
A1/3



A1/4

EXTERNAL VIEWS (1/500 SCALE)

A1/5 RIGHT PROFILE, 1941–1942
A1/6 PLAN, 1941–1942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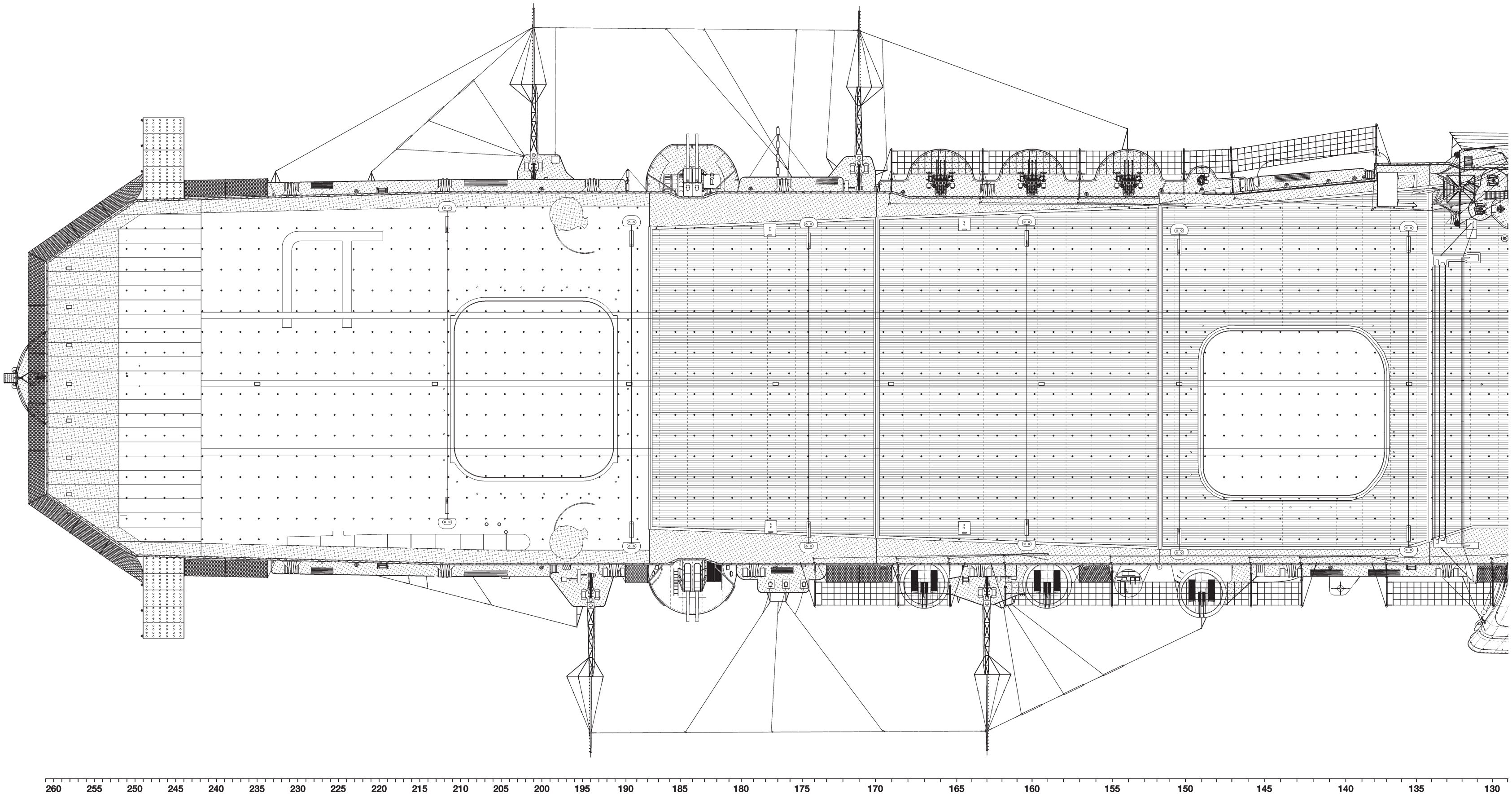
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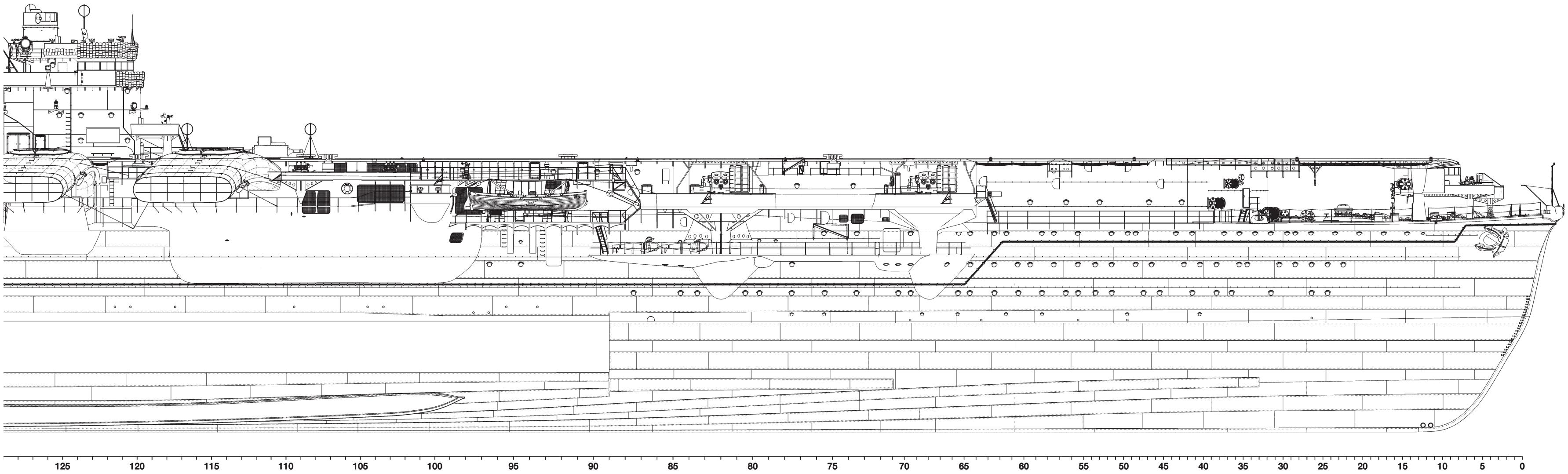
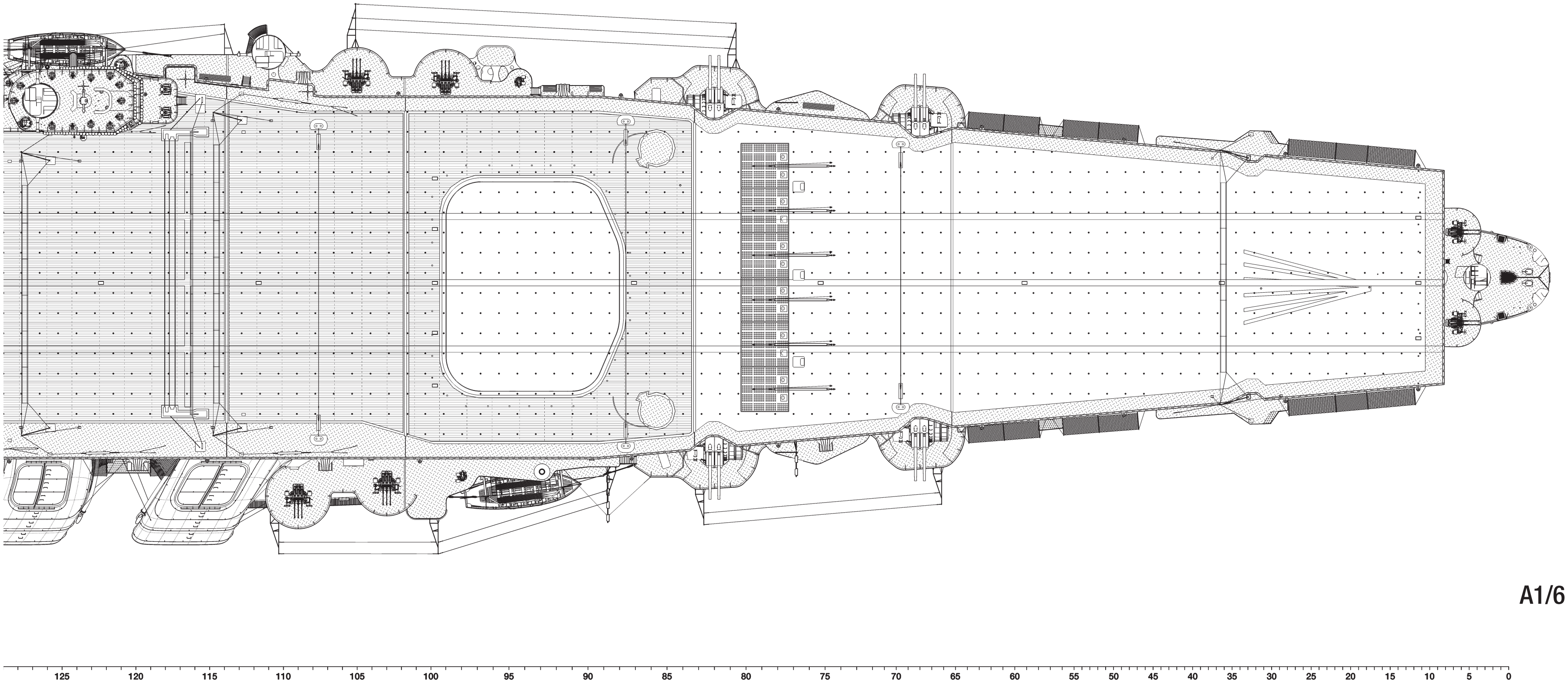


A1/5

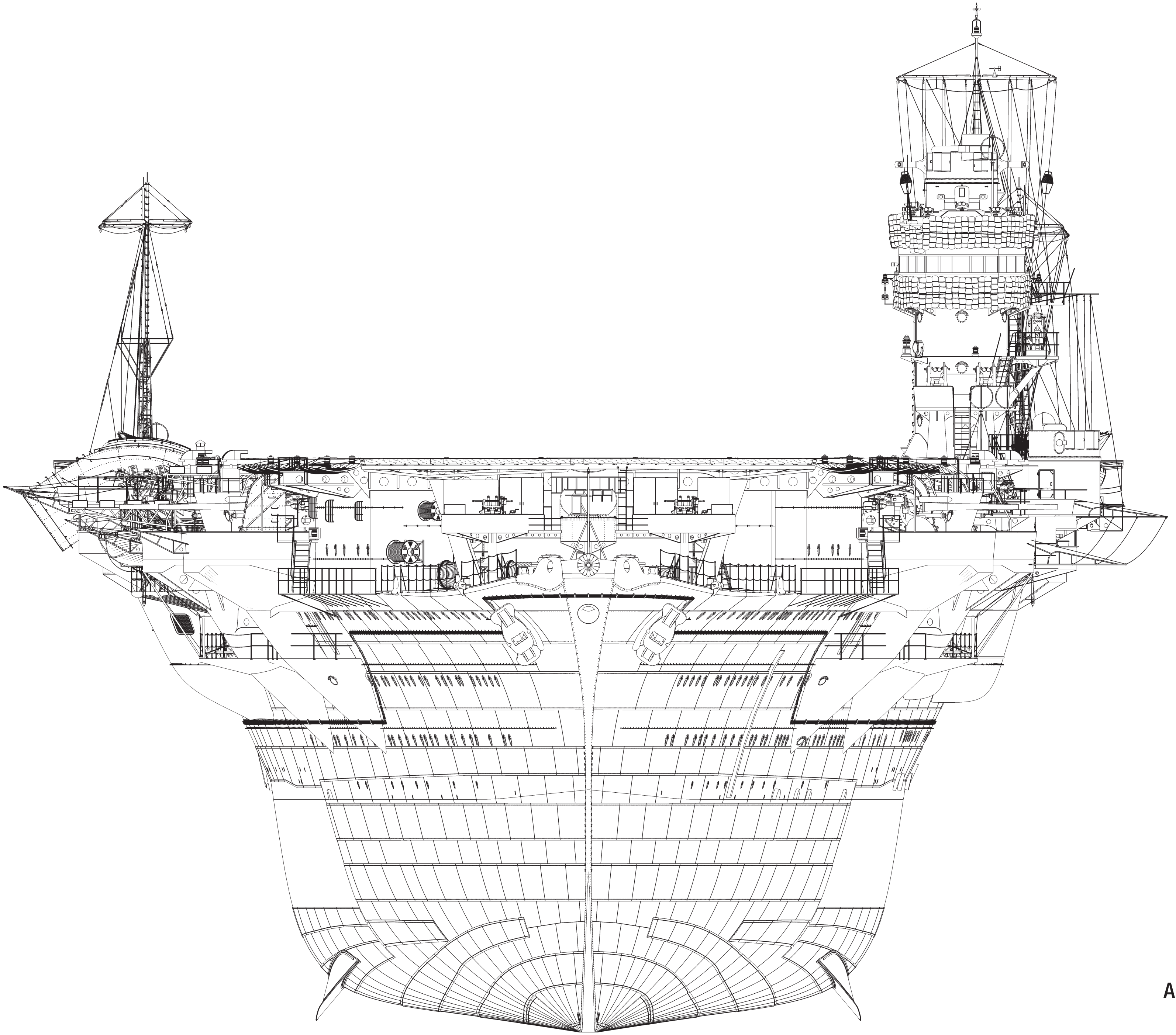


A1/6

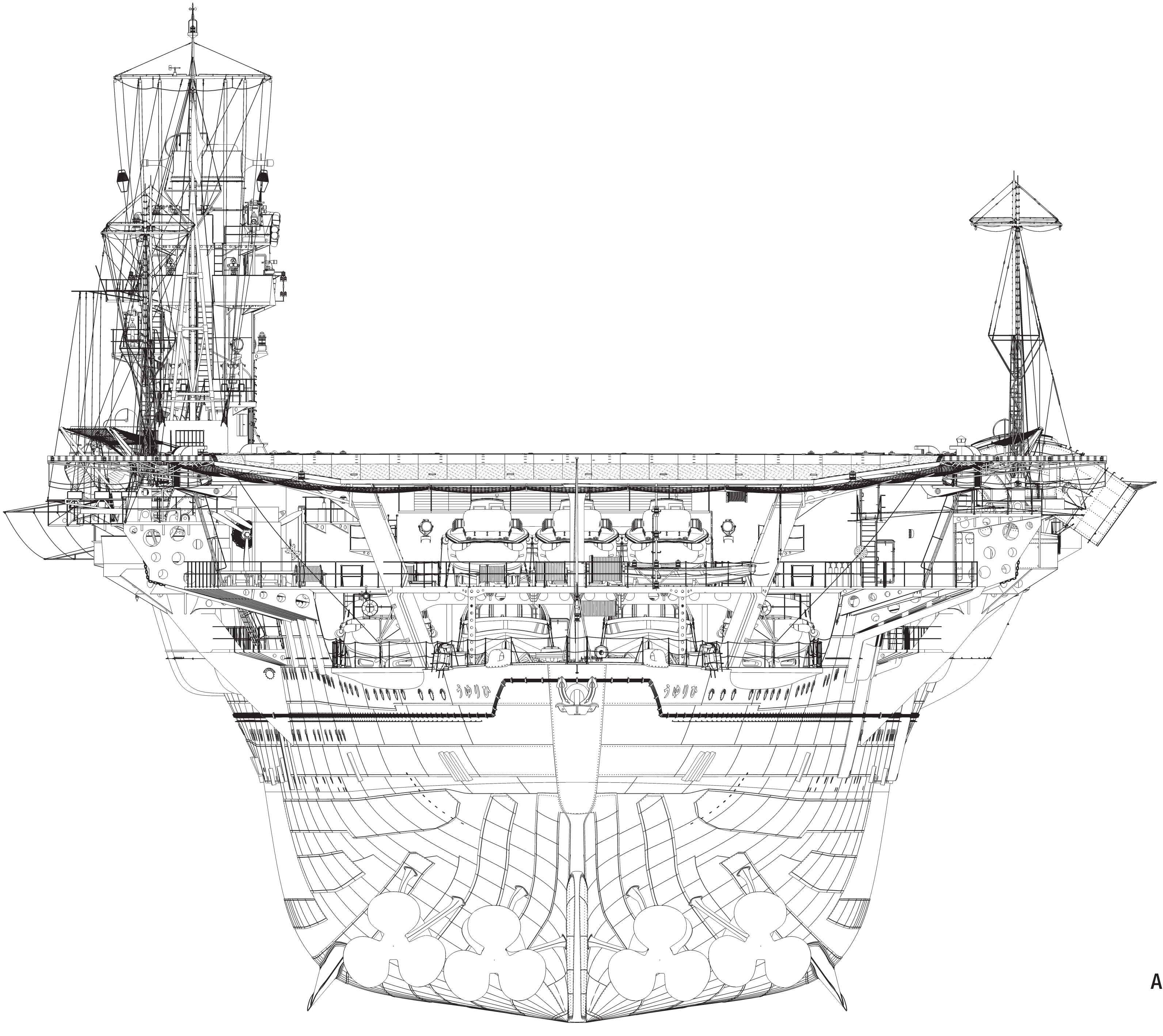
EXTERNAL VIEWS (1/200 SCALE)

A1/7 FRONT VIEW, 1941–1942

A1/8 BACK VIEW, 1941–1942



A1/7



A1/8

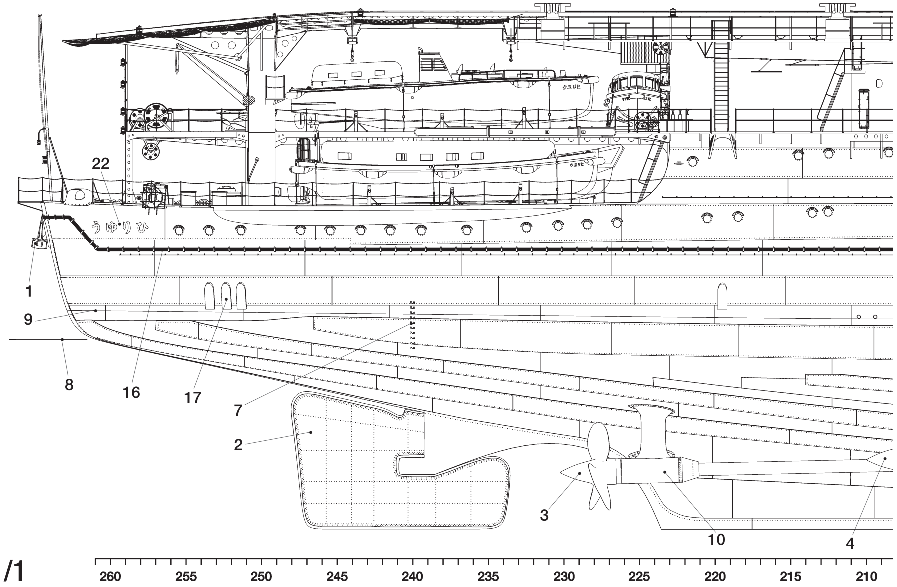
HULL EXTERNAL VIEWS WITH SHELL PLATING MARKED (1/300 SCALE)

B1/1 RIGHT PROFILE, FRAMES 135–261

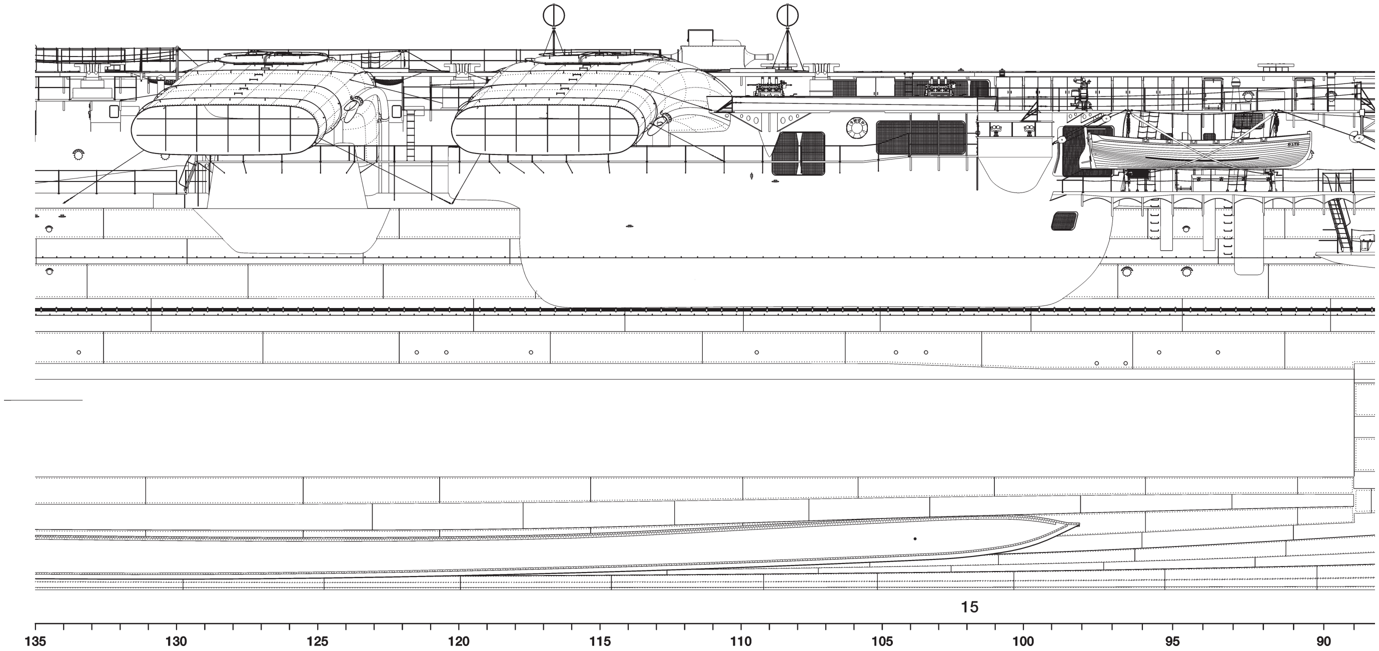
B1/2 RIGHT PROFILE, FRAMES 0–135

B1/1–6 HULL EXTERNAL VIEWS

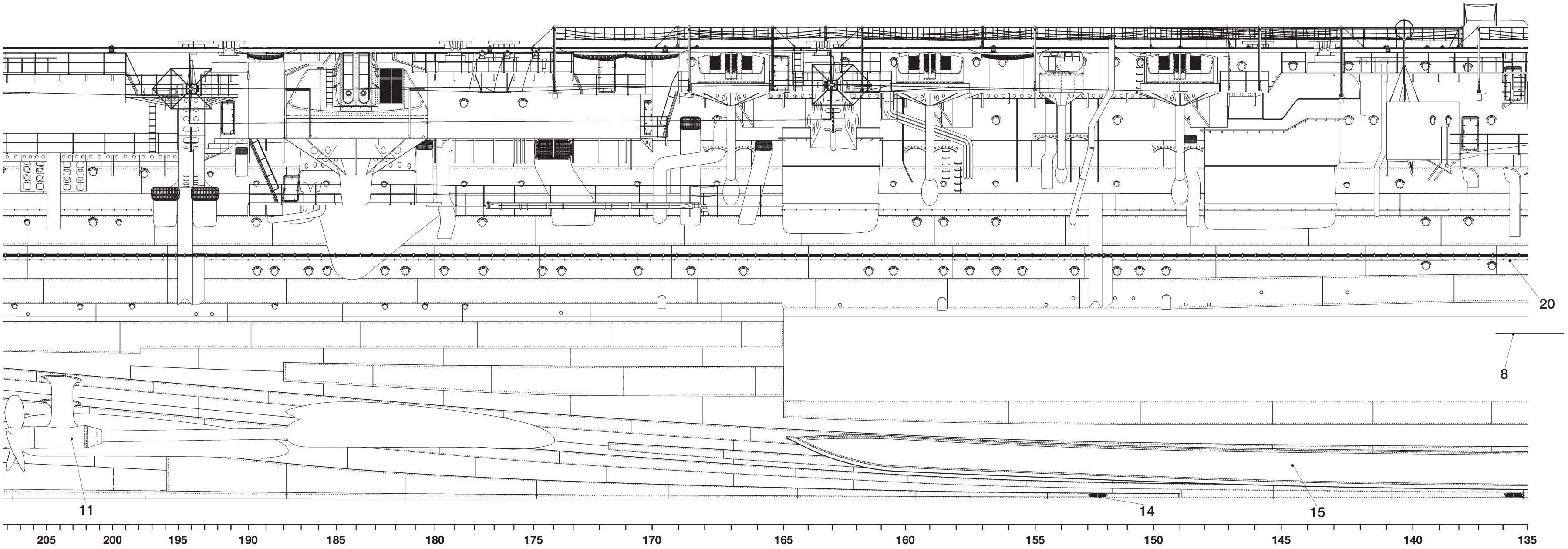
1 Stern anchor
2 Single semi-balanced rudder
3 Starboard side inner propeller (right-handed – clockwise rotating)
4 Starboard side outer propeller (right-handed – clockwise rotating)
5 Port side inner propeller (left-handed – anticlockwise rotating)
6 Port side outer propeller (left-handed – anticlockwise rotating)
7 White painted welded draught marks
8 Design waterline
9 Anti-fouling paint border (slightly rising at the bow and the stern)
10 Starboard side inner shaft and bracket
11 Starboard side outer shaft and bracket
12 Port side inner shaft and bracket
13 Port side outer shaft and bracket
14 Engine room water intake
15 Bilge keel
16 Degaussing cable (fitted around August 1941)
17 Scupper pipe
18 Main anchor
19 Mooring hawse
20 Handrail
21 Paravane towing eyes
22 Ship's name in hiragana, from right to left: ひ-り-ゆ-う, HI-RI-YU-U

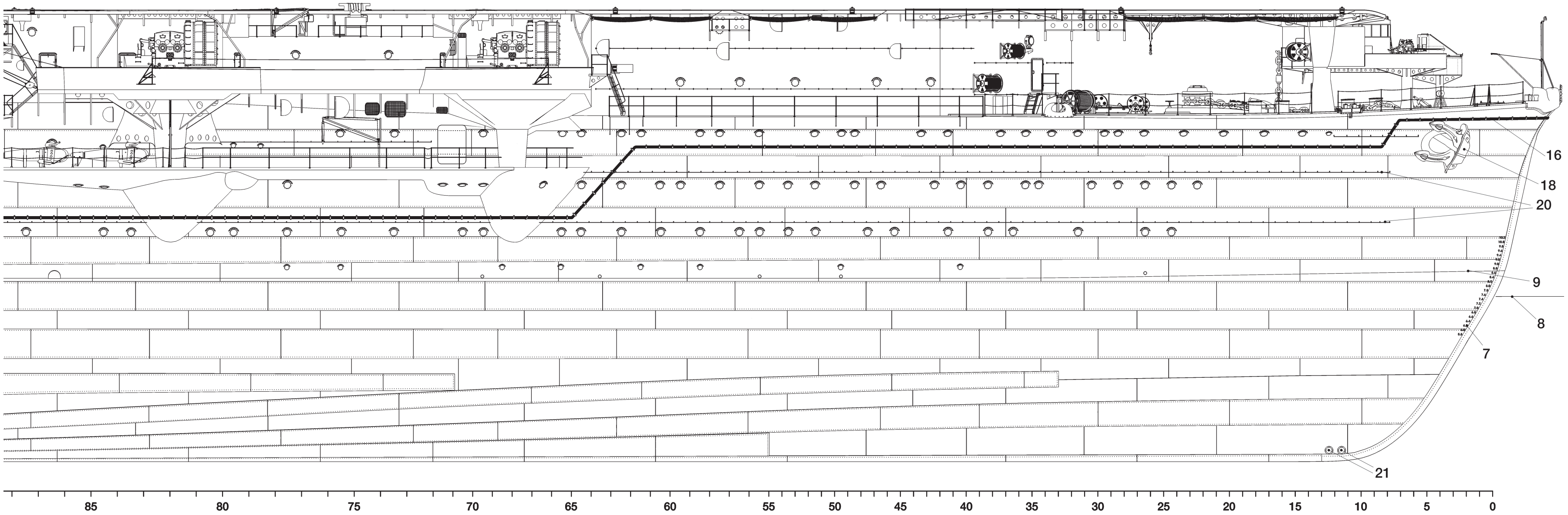


B1/1



B1/2

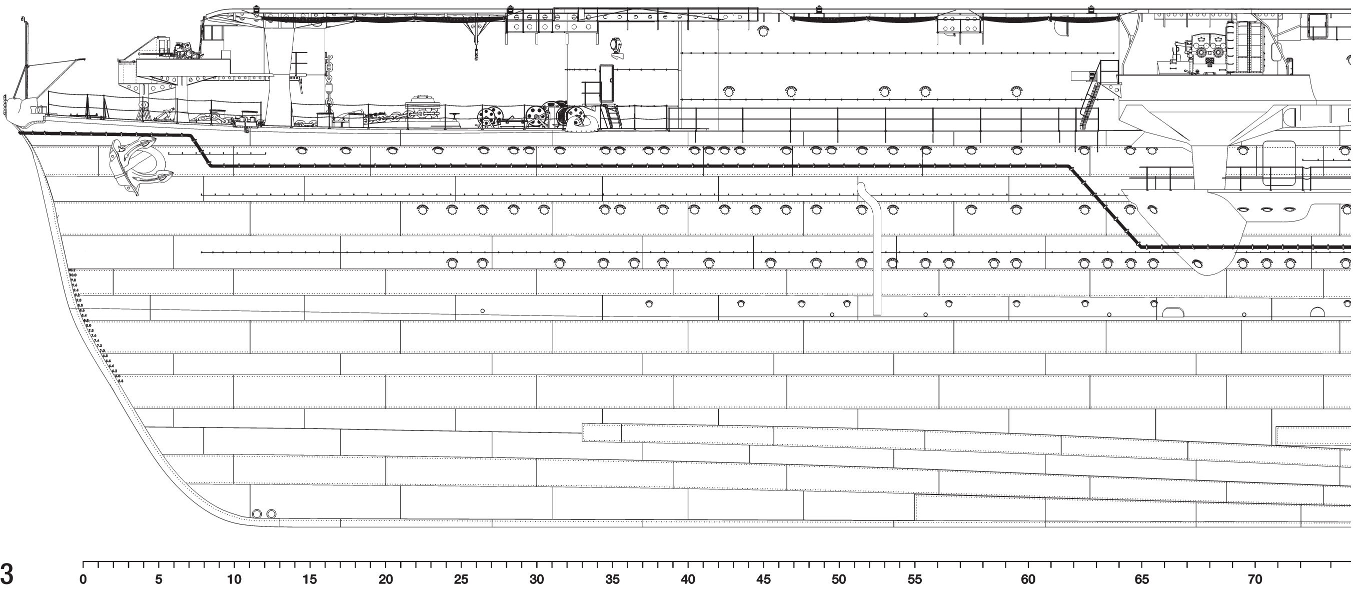




HULL EXTERNAL VIEWS WITH SHELL PLATING MARKED (1/300 SCALE)

B1/3 LEFT PROFILE, FRAMES 0–135

B1/4 LEFT PROFILE, FRAMES 135–261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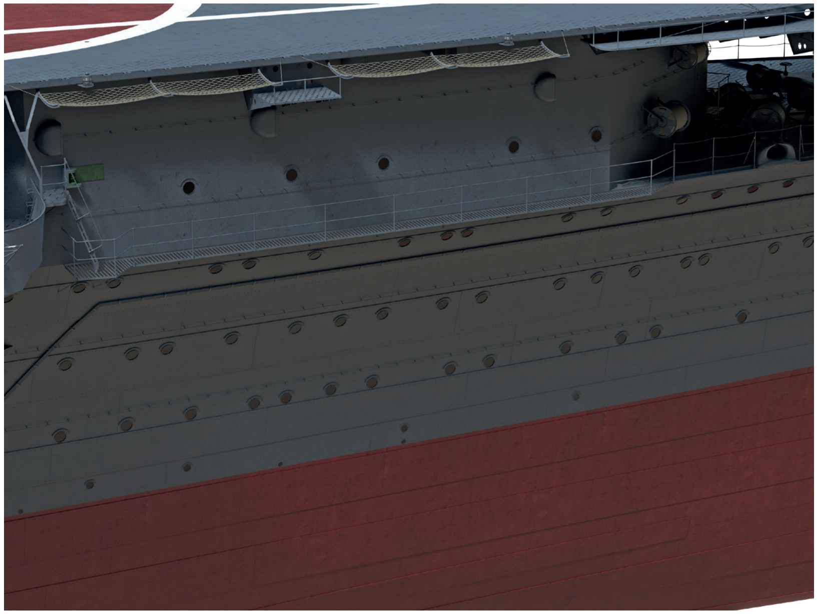
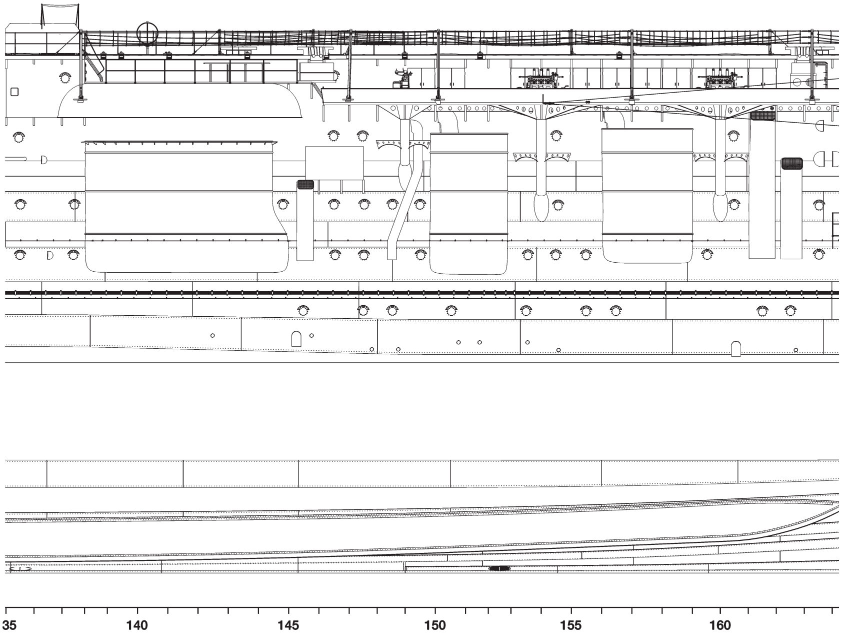
65
70

B1/3

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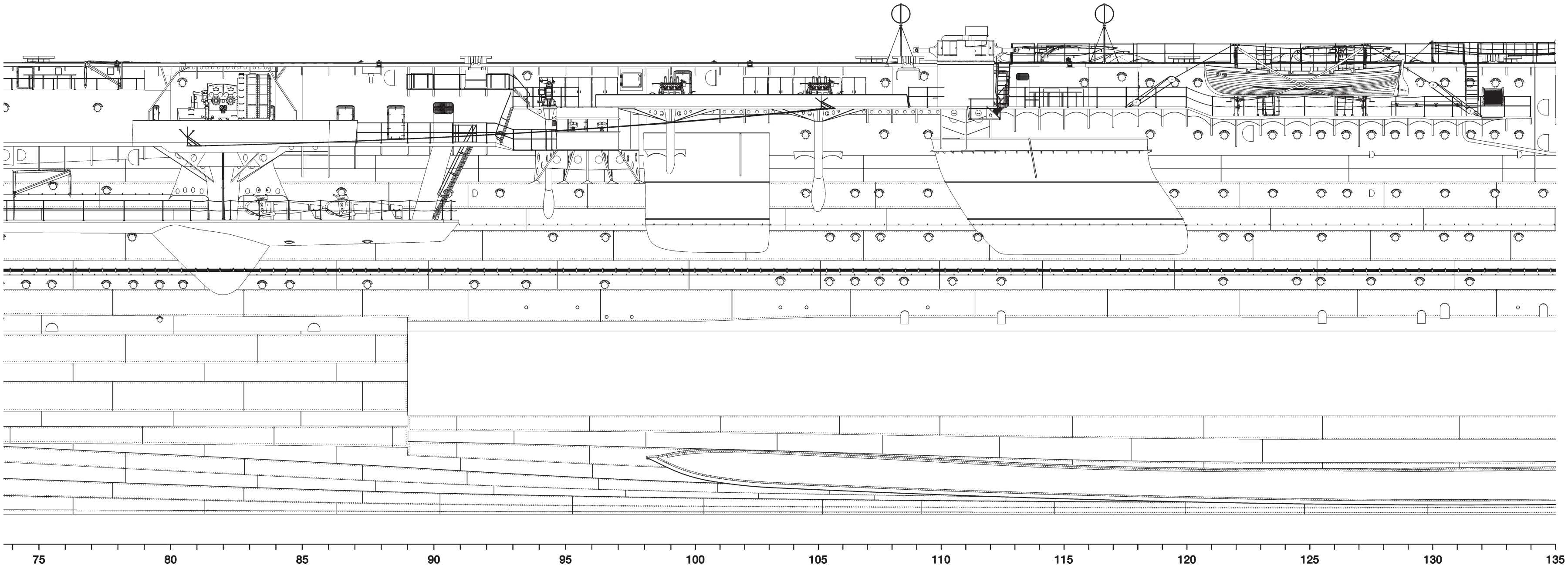
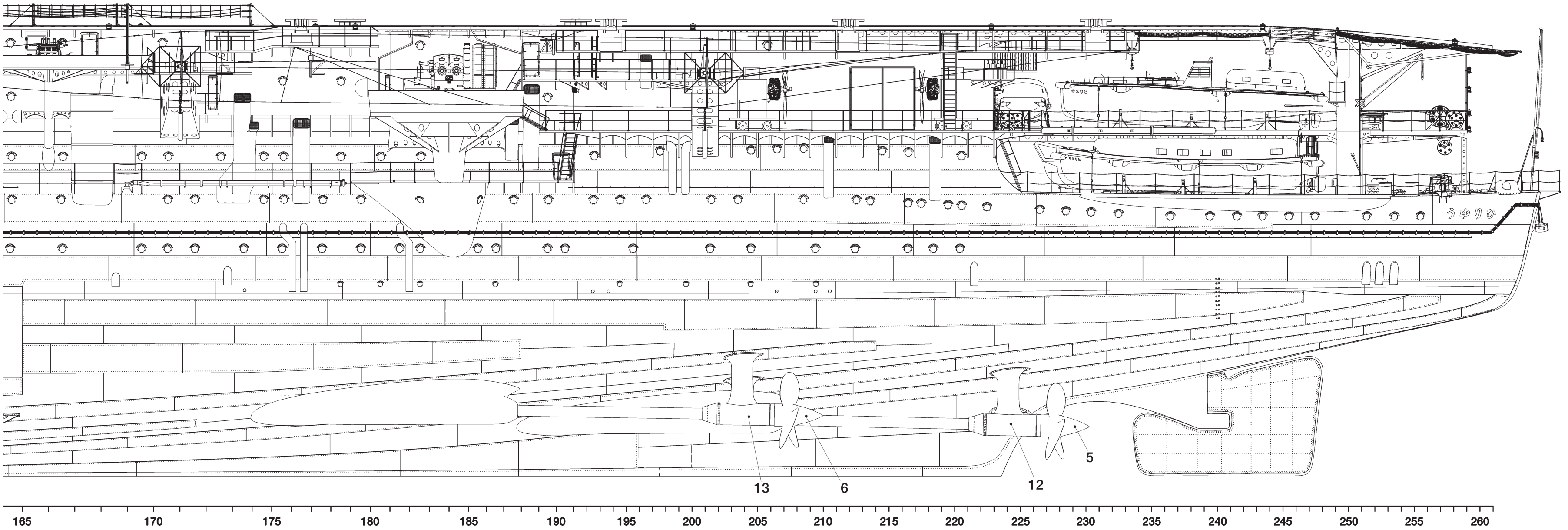
160

B1/4

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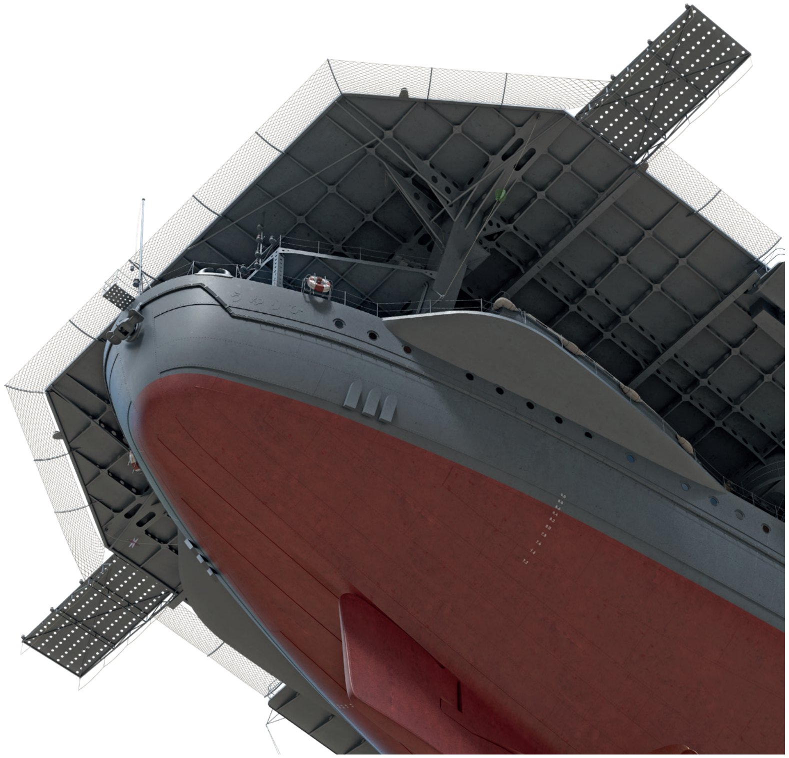
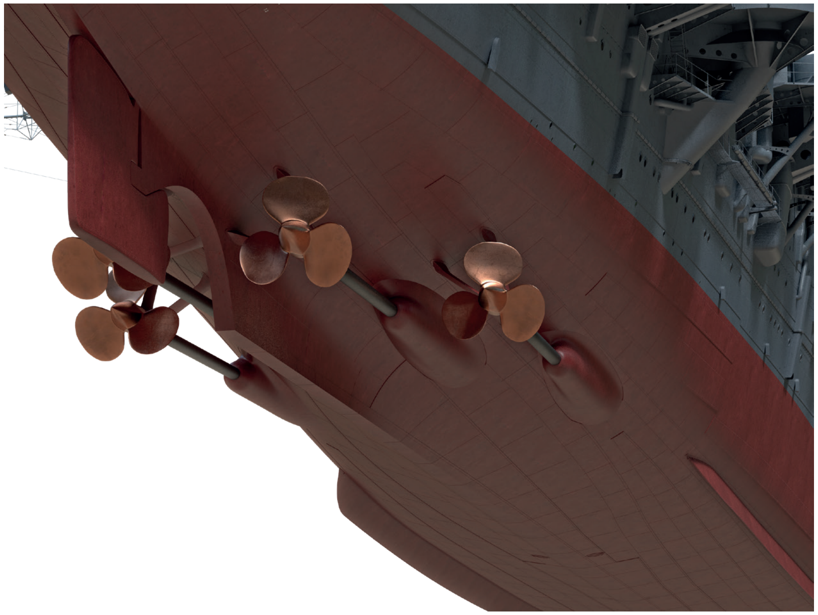
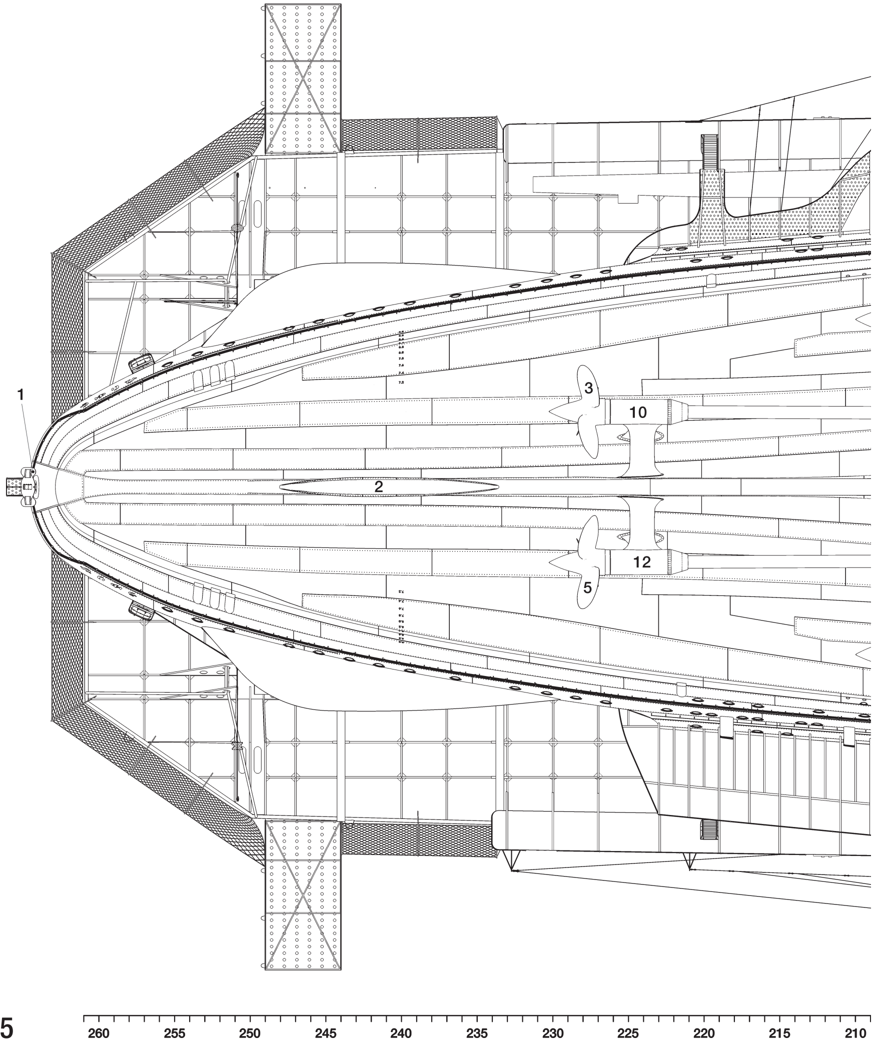
HULL EXTERNAL VIEWS WITH SHELL PLATING MARKED (1/300 SCALE)

B1/5 BOTTOM VIEW, FRAMES 135–261






1
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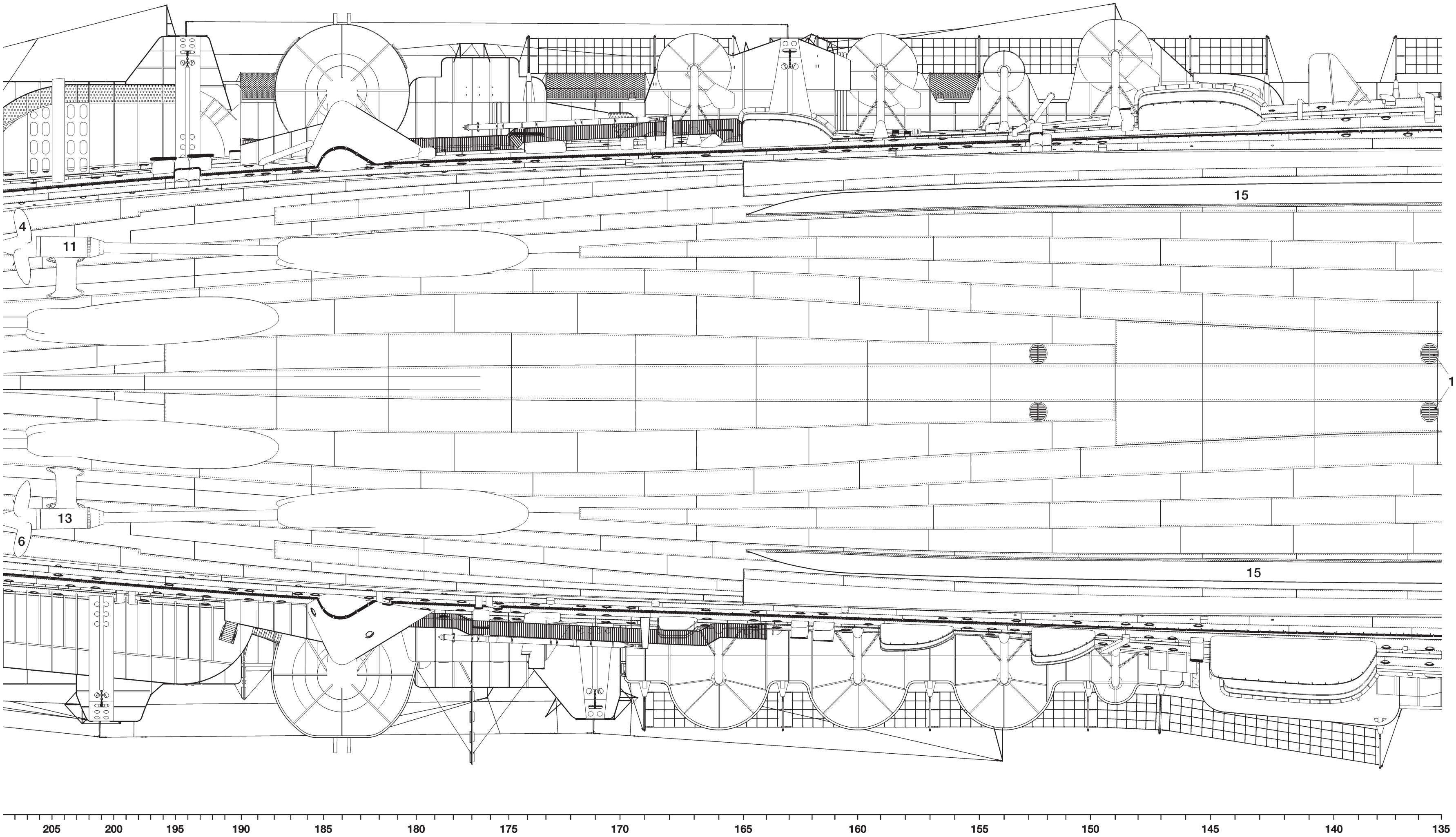
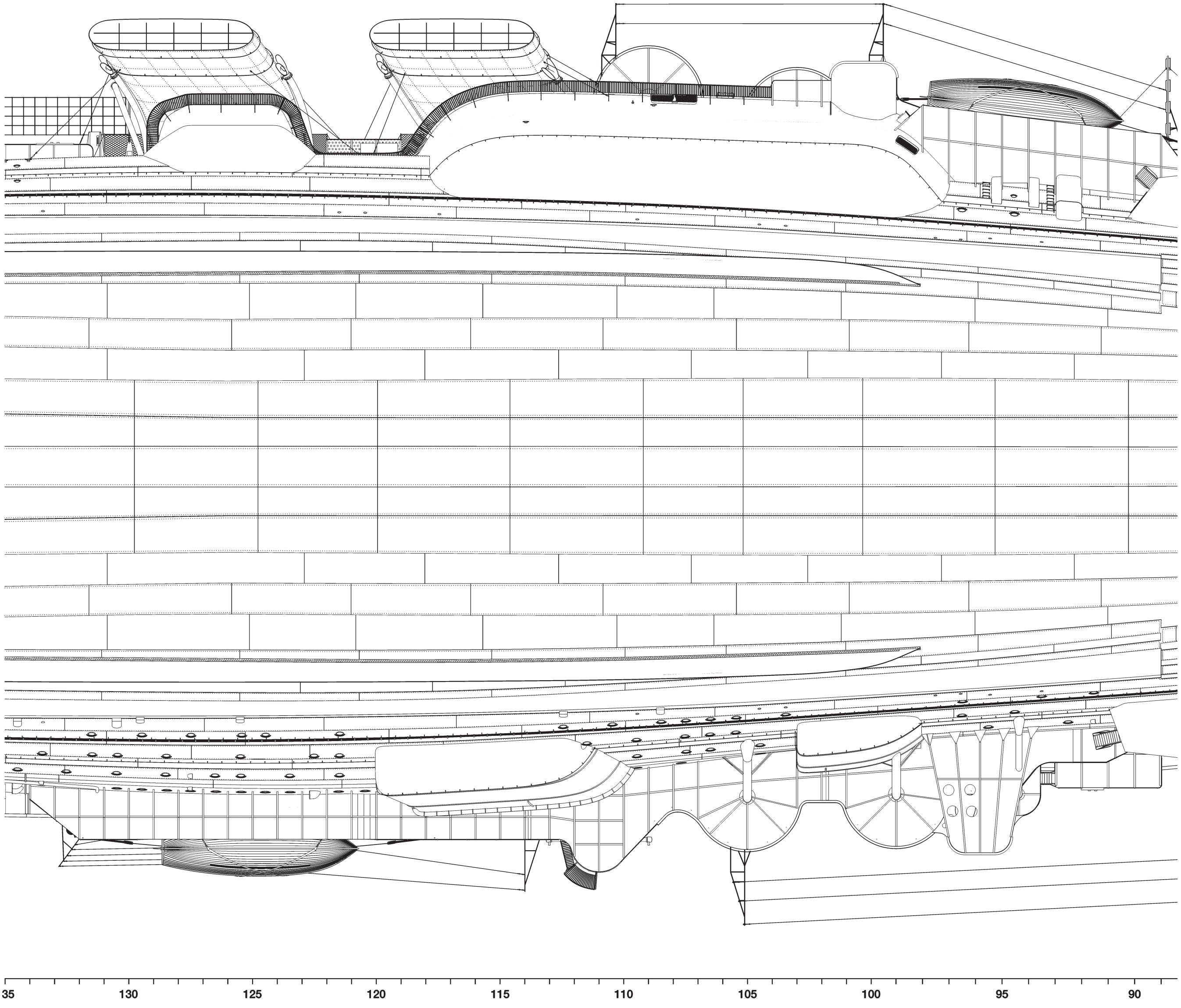
220
215
210

B1/5



HULL EXTERNAL VIEWS WITH SHELL PLATING MARKED (1/300 SCALE)

B1/6 BOTTOM VIEW, FRAMES 0–135


B1/6
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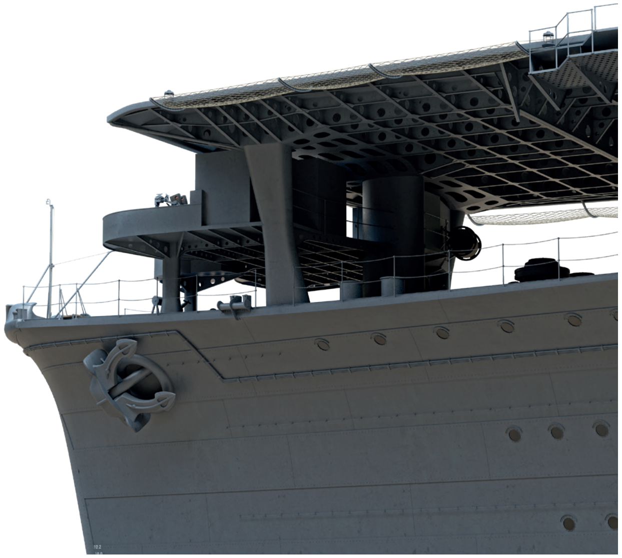
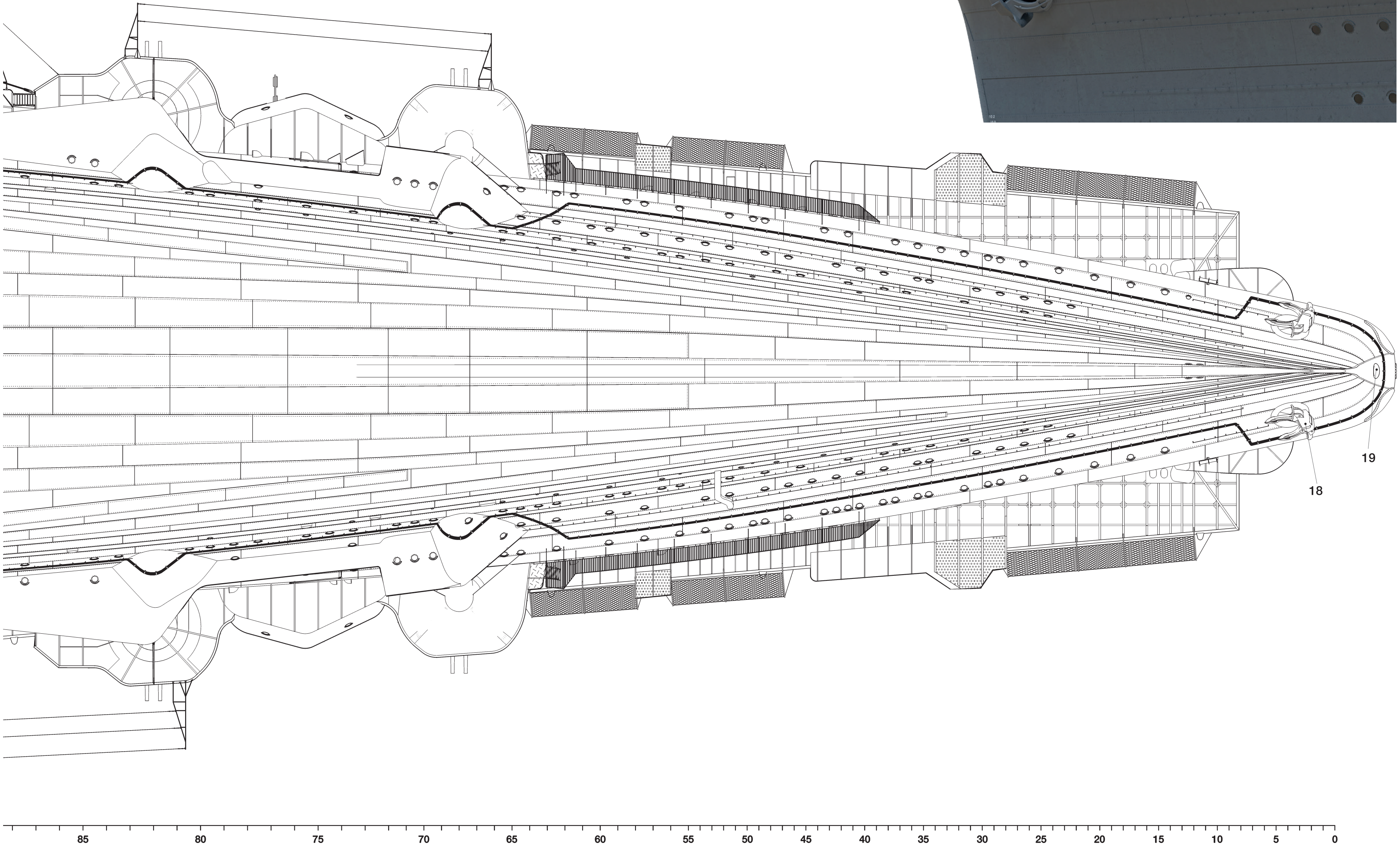
105
100
95
90

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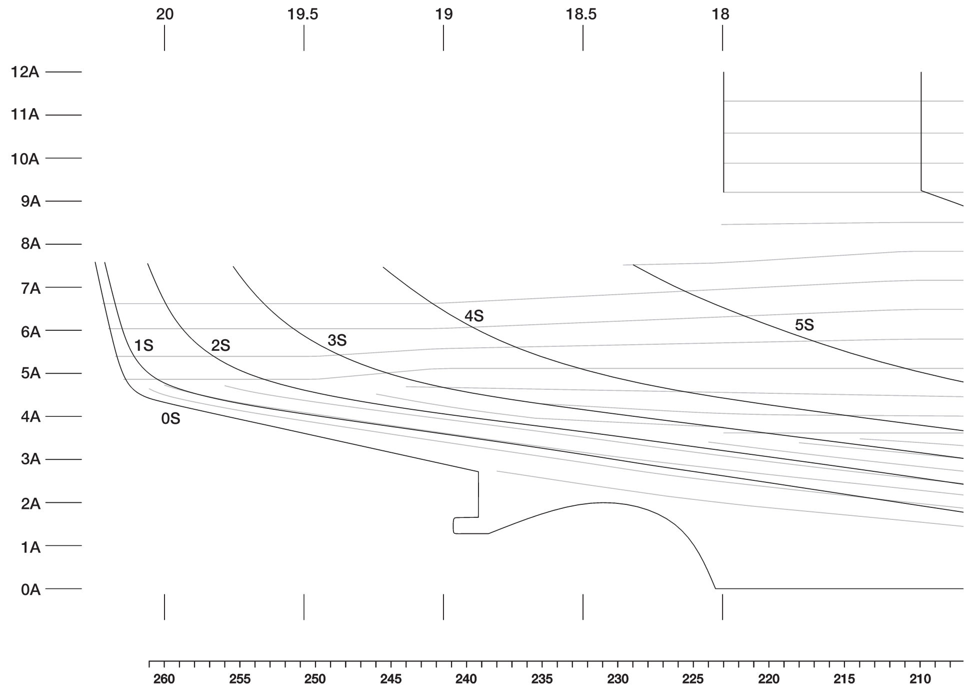
HULL LINES AND BODY PLANS, LONGITUDINALS SHOWN IN GREY

B1/7 SHEER ELEVATION, FRAMES 135–261 (1/300 SCALE)

B1/8 SHEER ELEVATION, FRAMES 0–135 (1/300 SCALE)


20
19.5
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12A
11A
10A
9A
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220
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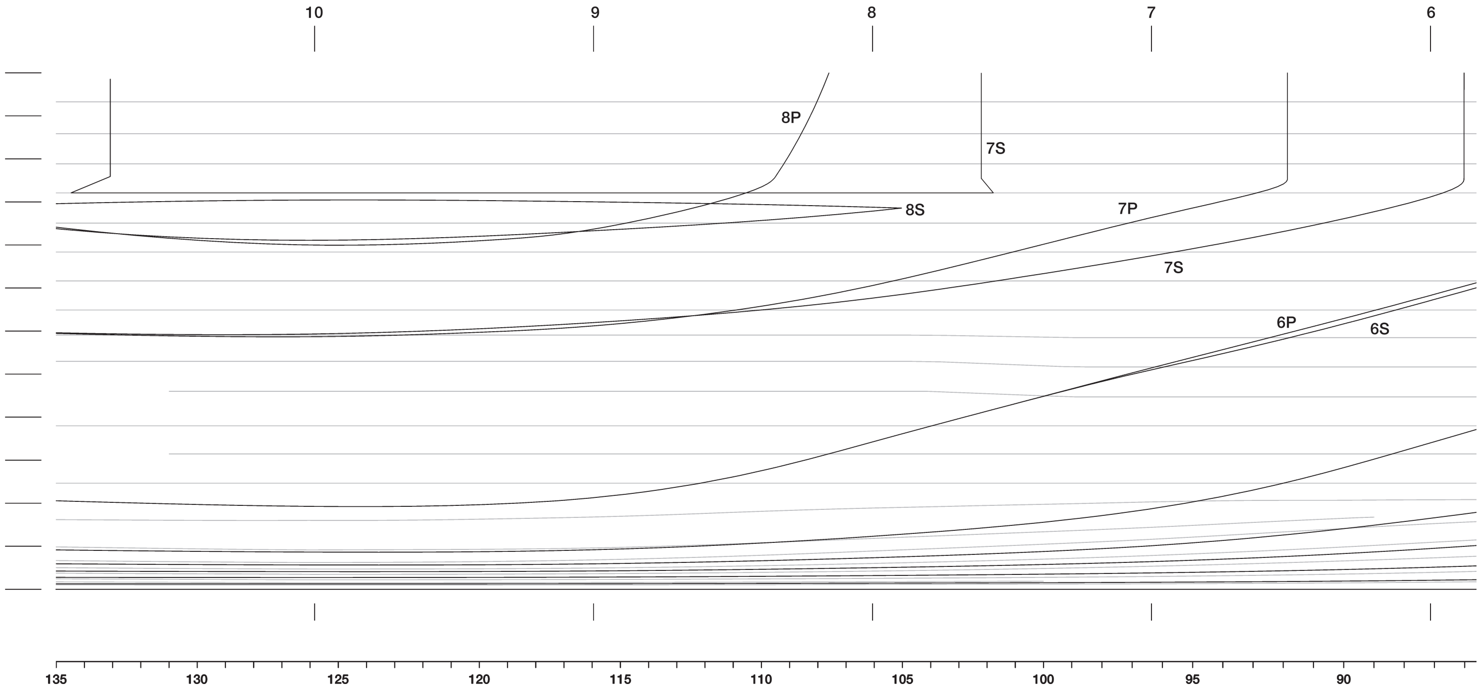
210

B1/7


10
9
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7
6
8P
7S
8S
7P
7S
6P
6S
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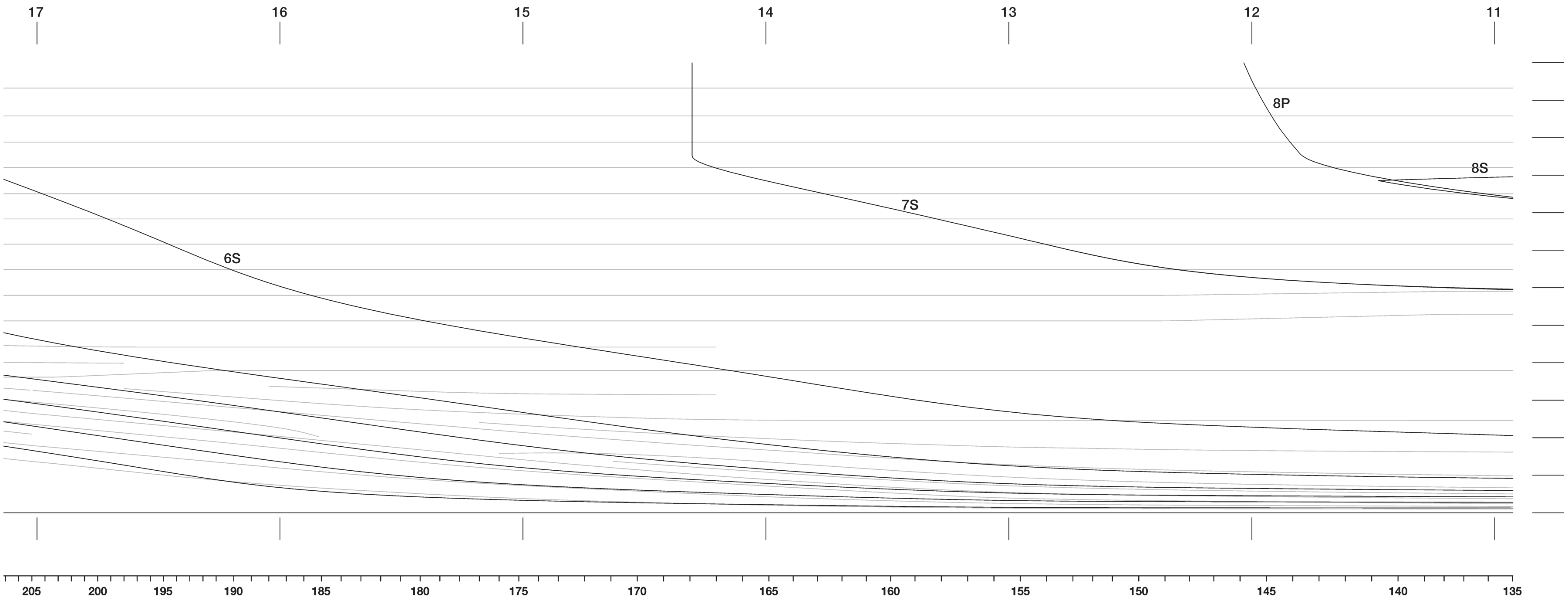
115
110
105
100
95
90

B1/8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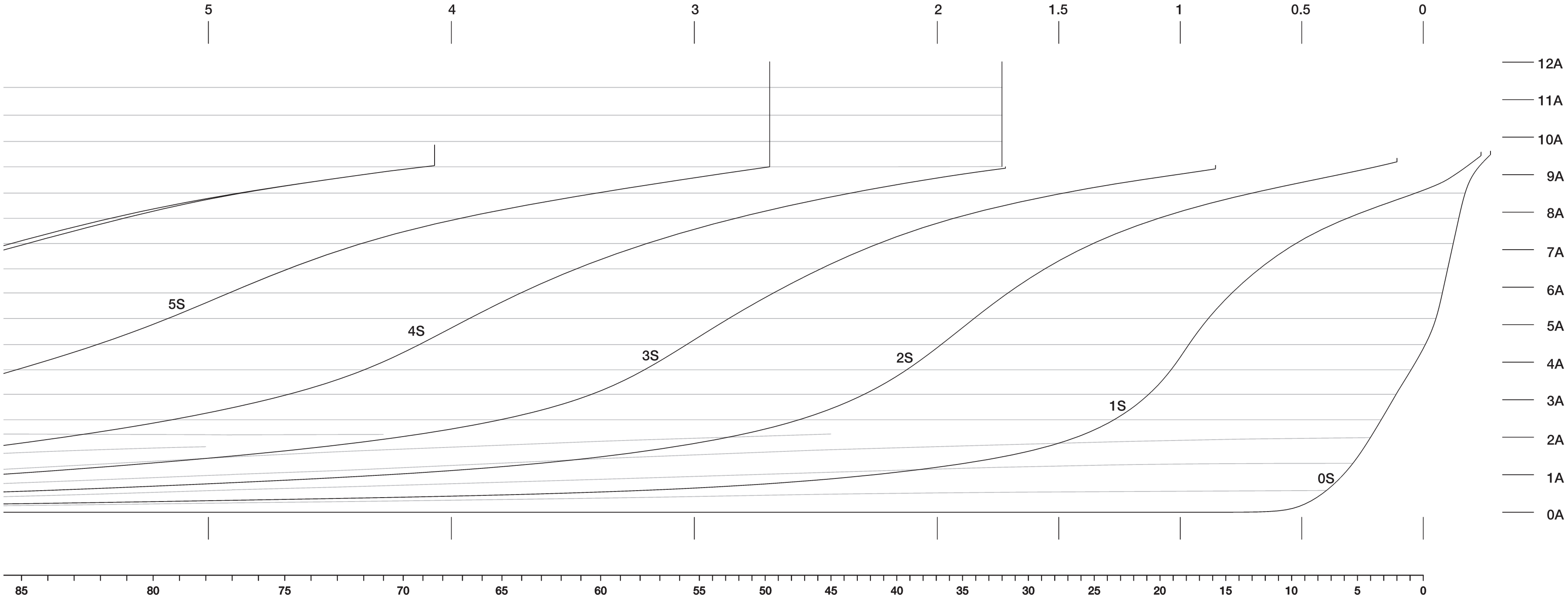
8S
7S
6S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10A
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7A
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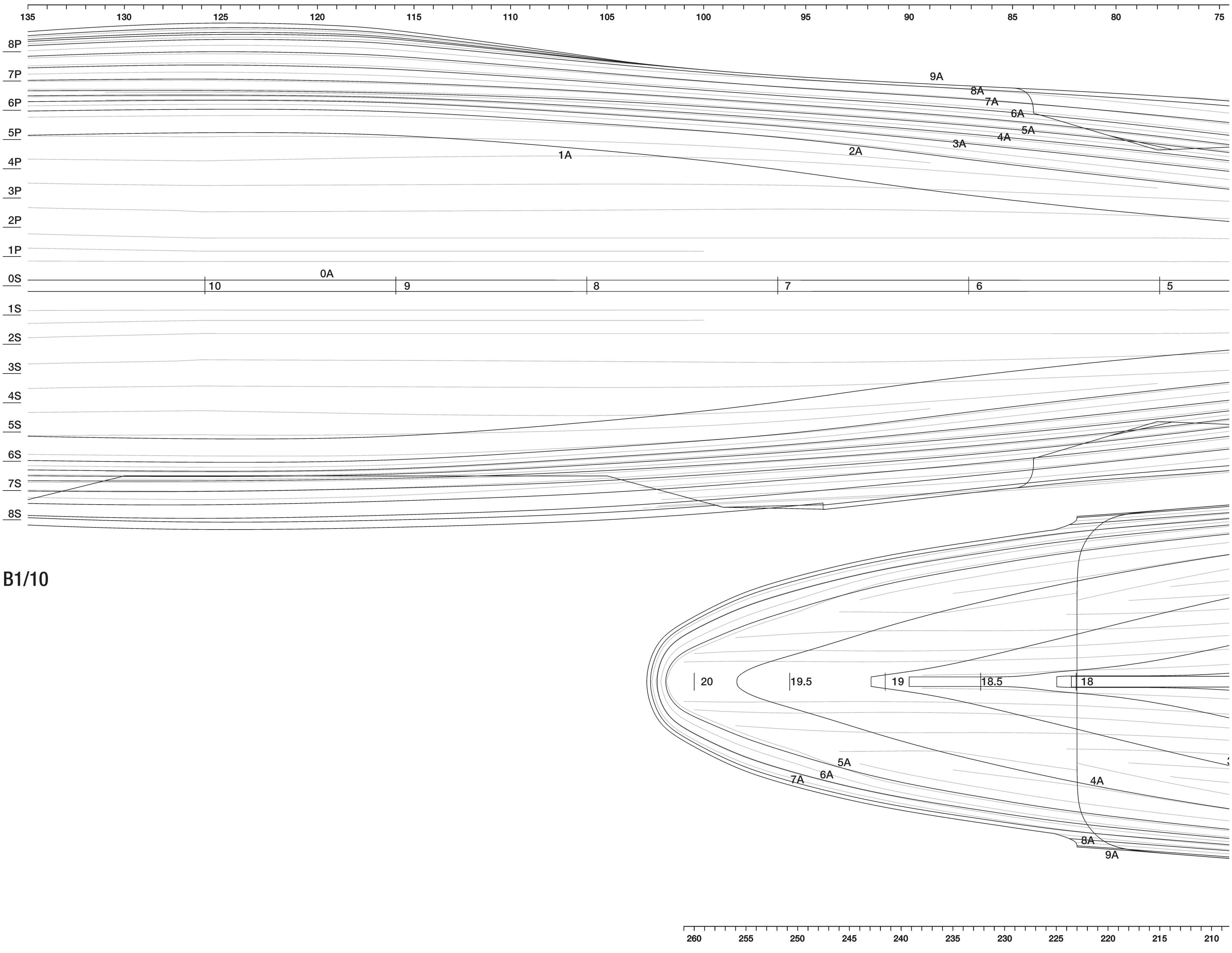
4A
3A
2A
1A
0A
5S
4S
3S
2S
1S
0S
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0

HULL LINES AND BODY PLANS, LONGITUDINALS SHOWN IN GREY

B1/9 WATERLINE PLAN, FRAMES 135–261 (1/300 SCALE)

B1/10 WATERLINE PLAN, FRAMES 0–135 (1/300 SCALE)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4S
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3A
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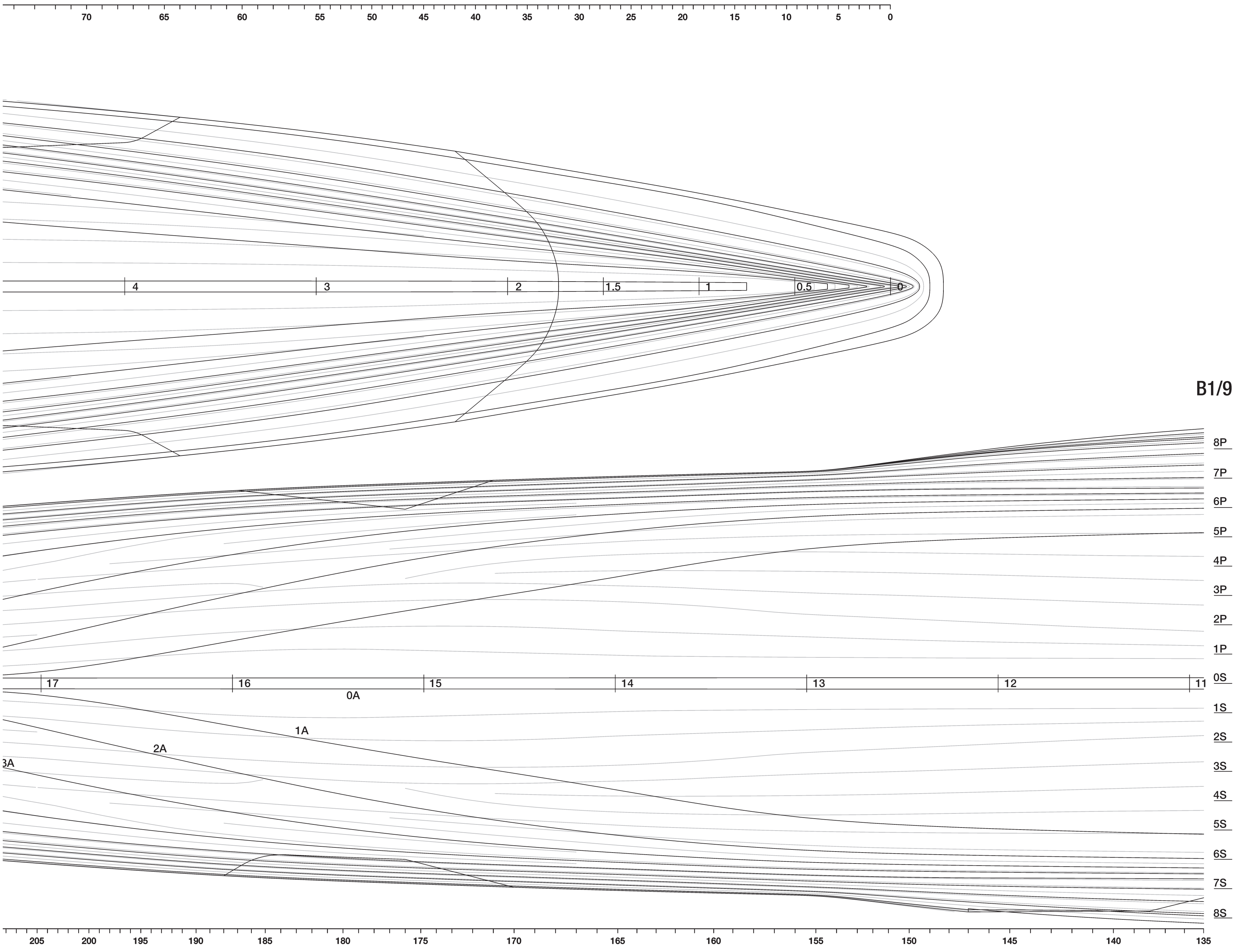
B1/10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205
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155
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145
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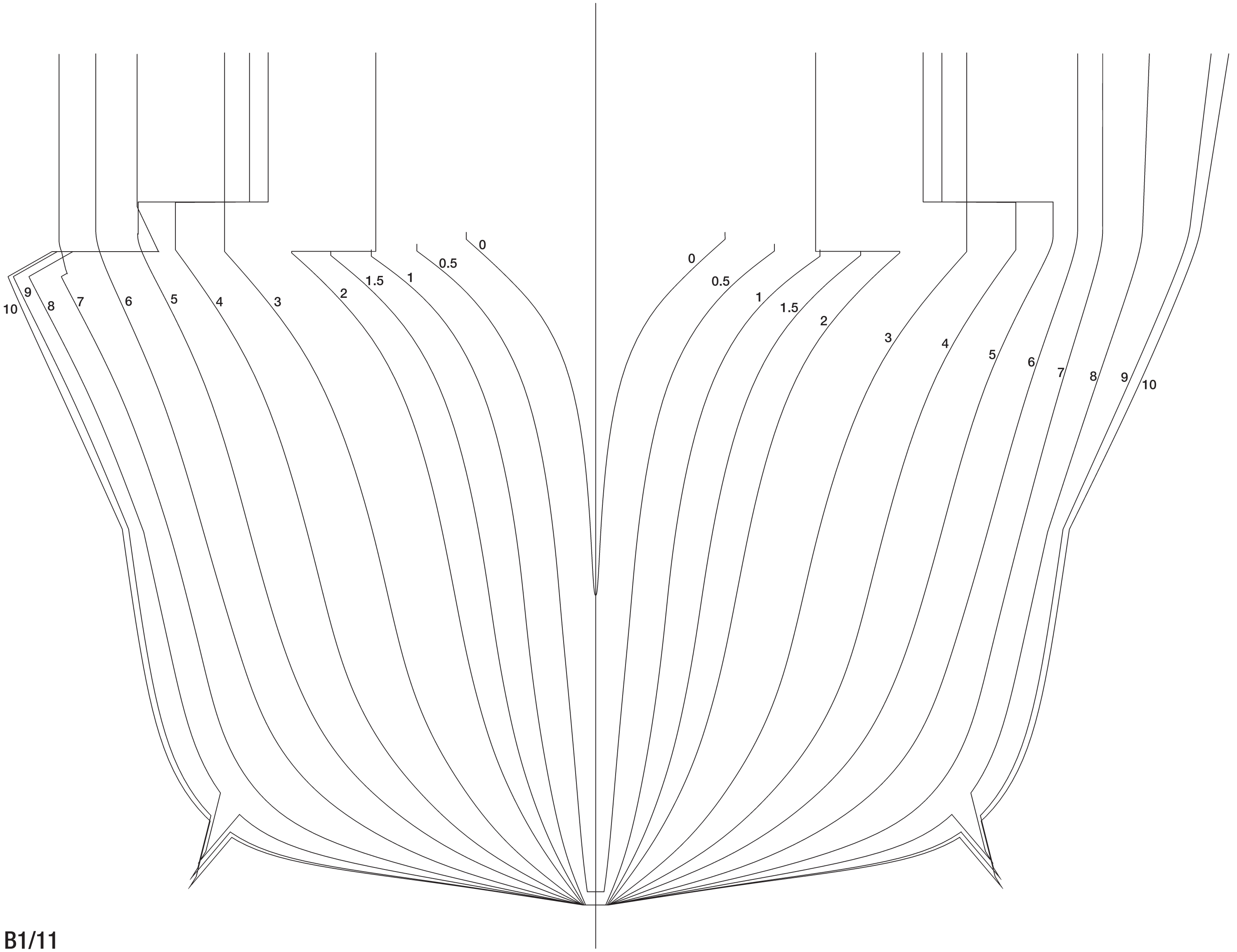
135

B1/9

HULL LINES AND BODY PLANS, LONGITUDINALS SHOWN IN GREY

B1/11 BODY PLANS, FRAMES 0–135 (1/150 SCALE)

B1/12 BODY PLANS, FRAMES 135–261 (1/150 SCALE)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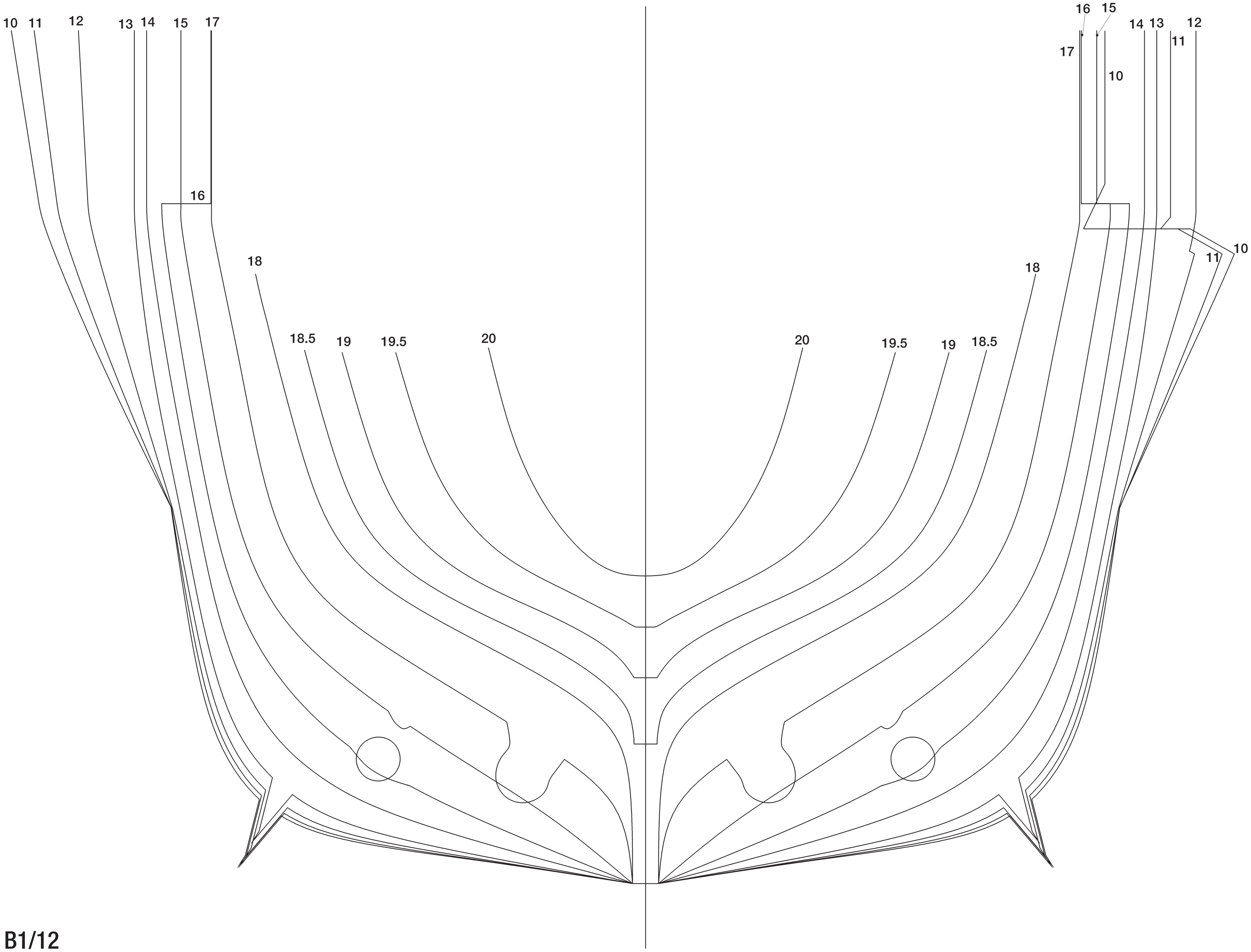
B1/11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B1/12

GENERAL ARRANGEMENTS OF PROTECTION (1/500 SCALE)

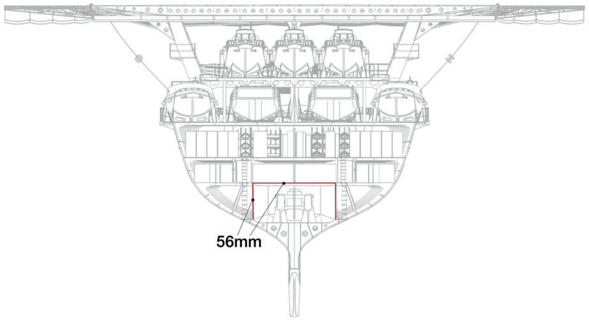
B1/13 INTERNAL PROFILE WITH ARMOUR LAYOUT

B1/14 TRANSVERSE SECTION WITH ARMOUR LAYOUT, FRAME 234 LOOKING AFT

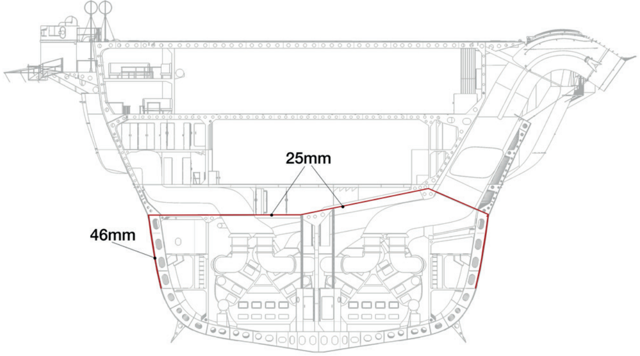
B1/15 TRANSVERSE SECTION WITH ARMOUR LAYOUT, FRAME 117 LOOKING FORWARD

B1/16 TRANSVERSE SECTION WITH ARMOUR LAYOUT, FRAME 84 LOOKING FORWARD

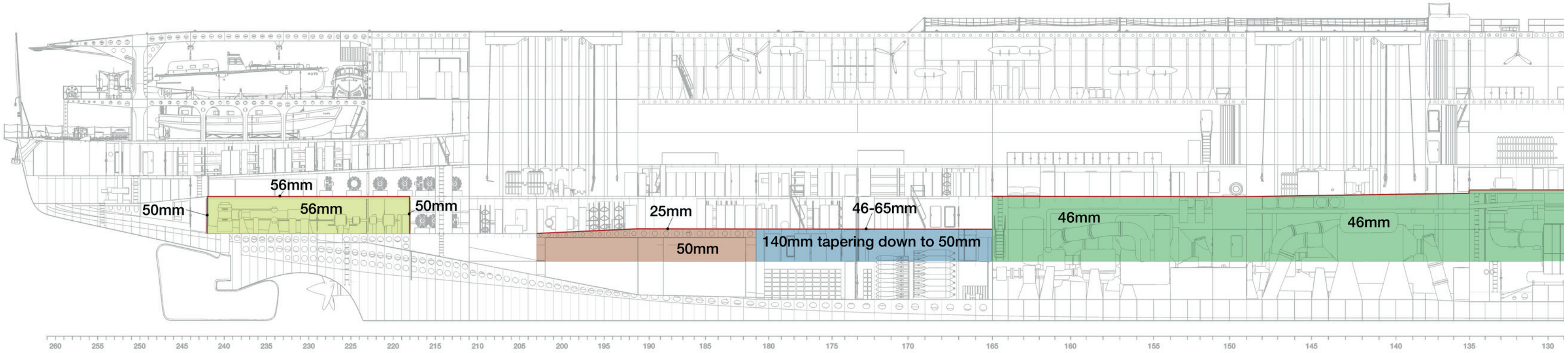
B1/17 TRANSVERSE SECTION WITH ARMOUR LAYOUT, FRAME 64 LOOKING AFT



B1/14



B1/15


56mm
50mm
56mm
50mm
25mm
46-65mm
50mm
140mm tapering down to 50mm
46mm
46mm
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225
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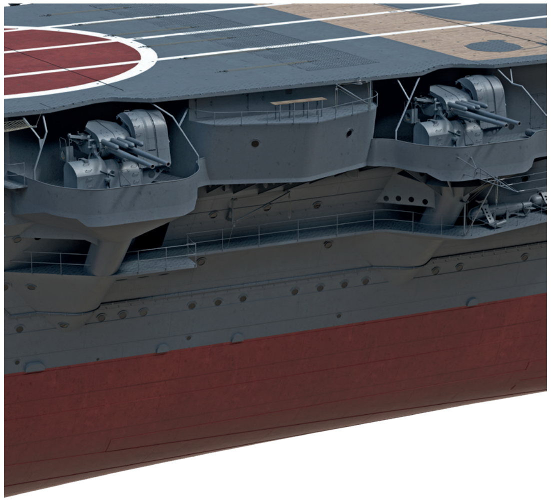
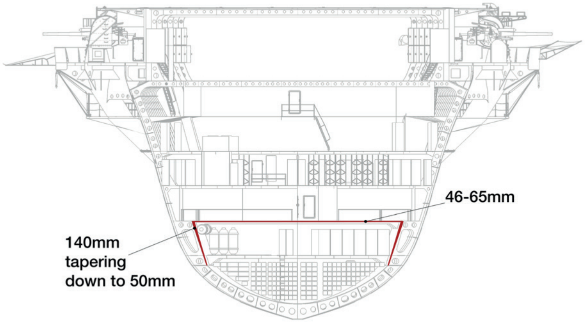
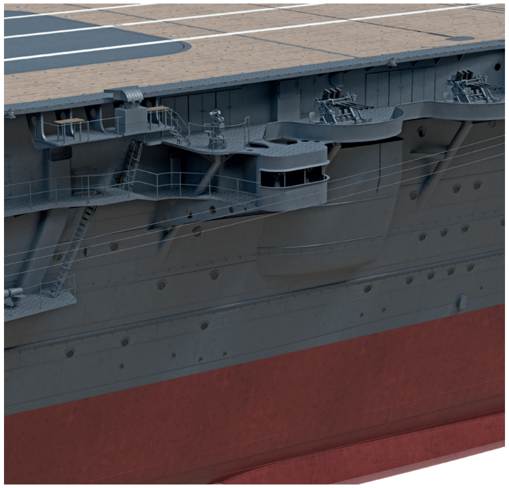
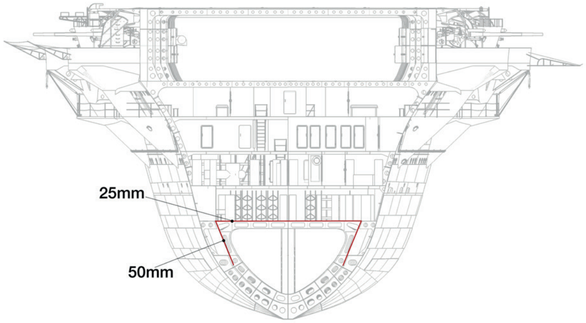
B1/13




46-65mm
140mm tapering down to 50mm

B1/16

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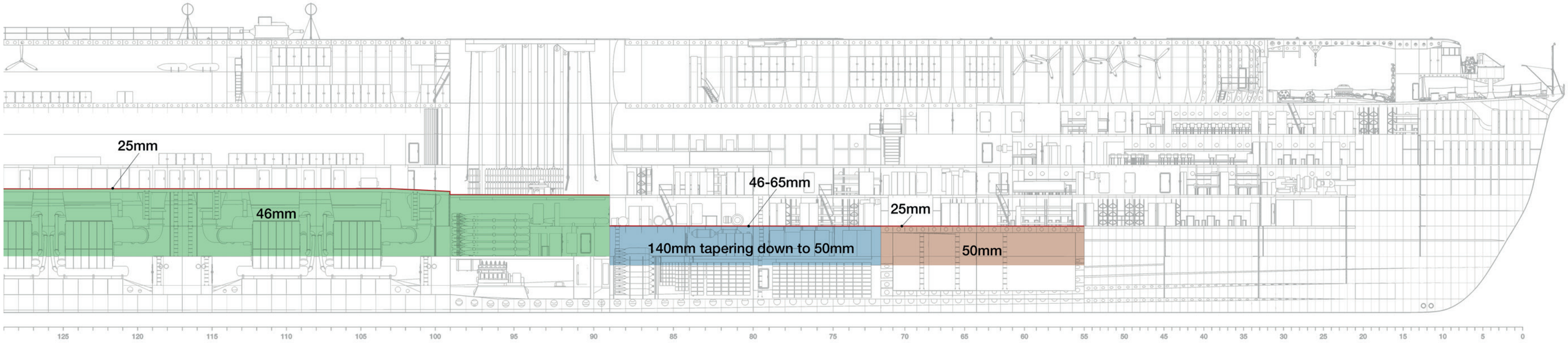
50mm

B1/17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46-65mm
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140mm tapering down to 50mm
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GENERAL ARRANGEMENTS OF BOILER UPTAKES AND AIR SUPPLY DUCTS (1/500 SCALE)

B1/18 RIGHT PROFILE

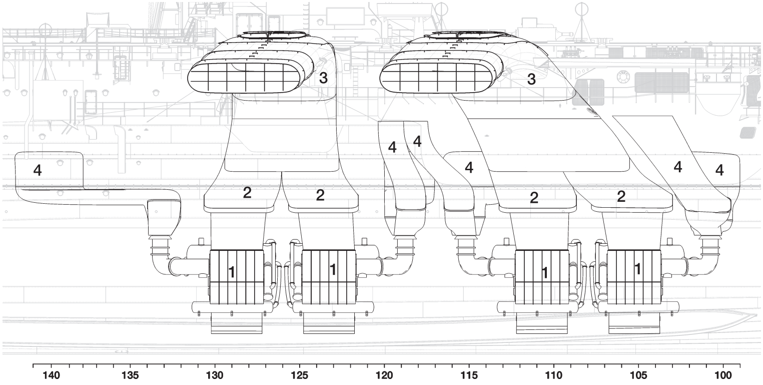
B1/19 PLAN

B1/20 VIEW FROM FRAME 108 LOOKING AFT

B1/21 VIEW FROM FRAME 135 LOOKING FORWARD

B1/18–21 GENERAL ARRANGEMENTS OF BOILER UPTAKES AND AIR SUPPLY DUCTS

- **1** Boiler
- **2** Funnel uptake
- **3** Funnel
- **4** Air supply duct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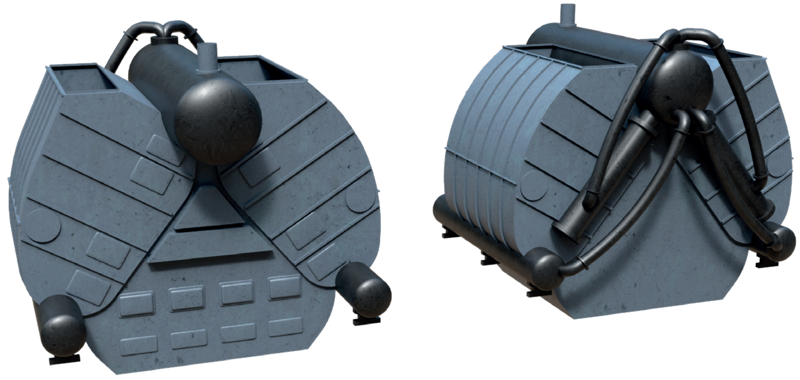
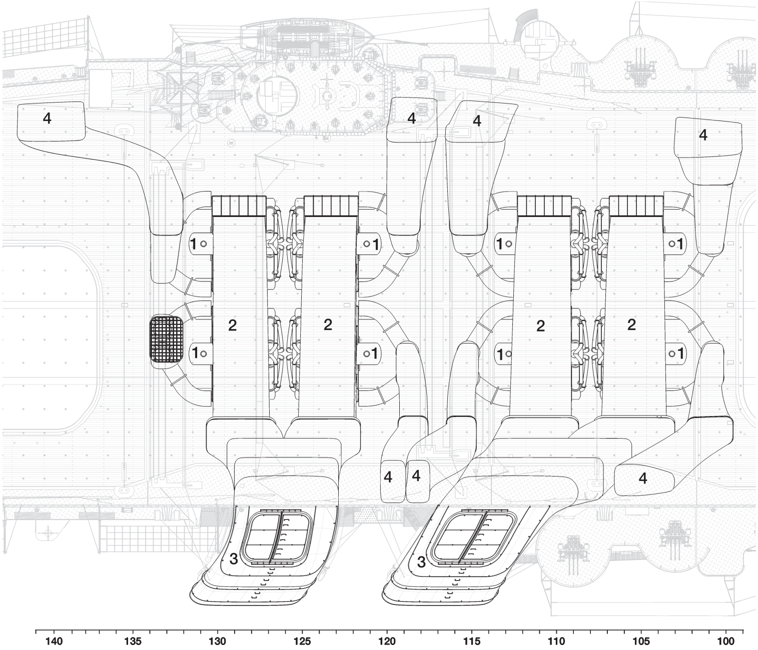
B1/18

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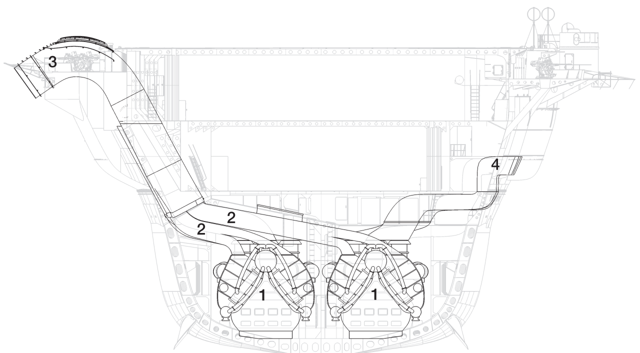
B1/19



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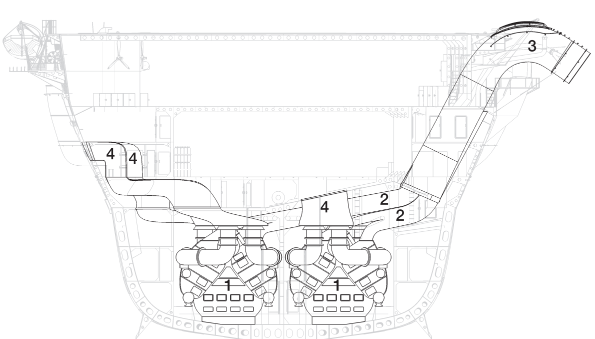

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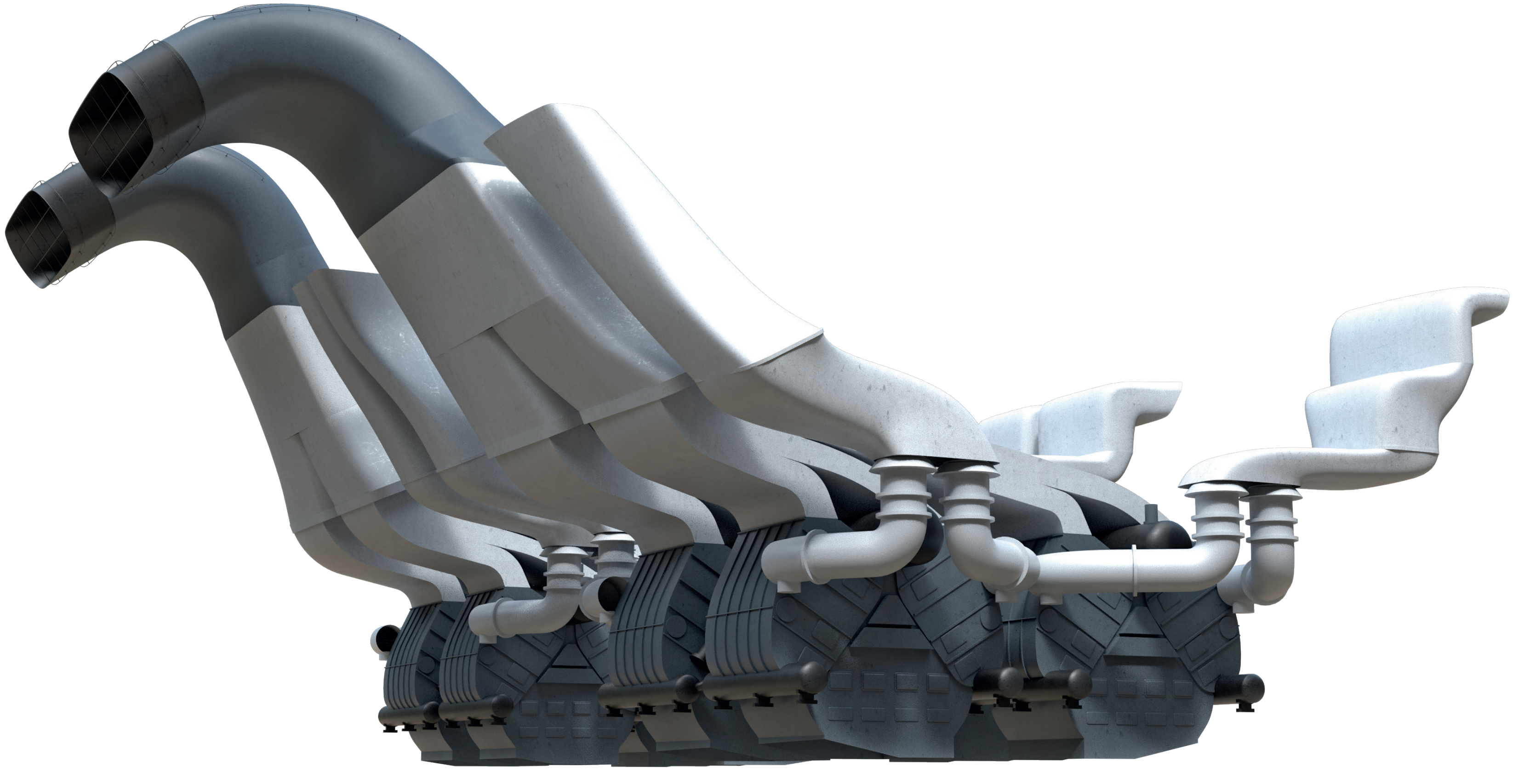
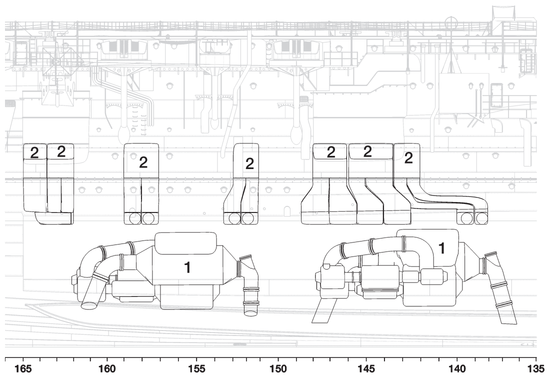


GENERAL ARRANGEMENTS OF MACHINERY VENT DUCTS (1/500 SCALE)

B1/22 RIGHT PROFILE
B1/23 PLAN
B1/24 VIEW FROM FRAME 135 LOOKING AFT
B1/25 VIEW FROM FRAME 165 LOOKING FORWARD

B1/22–25 GENERAL ARRANGEMENTS OF MACHINERY VENT DUCTS

1 Turbine set
2 Air supply duct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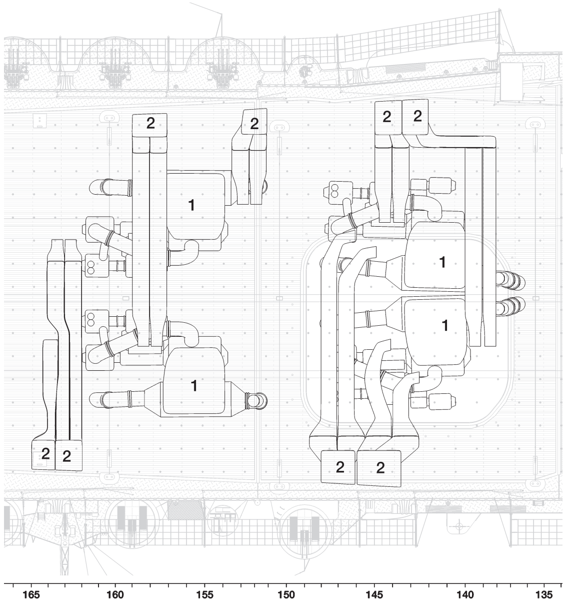
B1/22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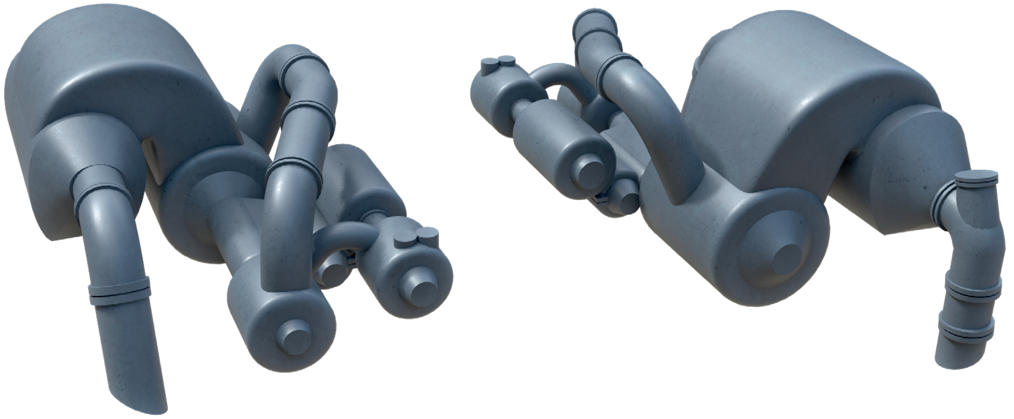
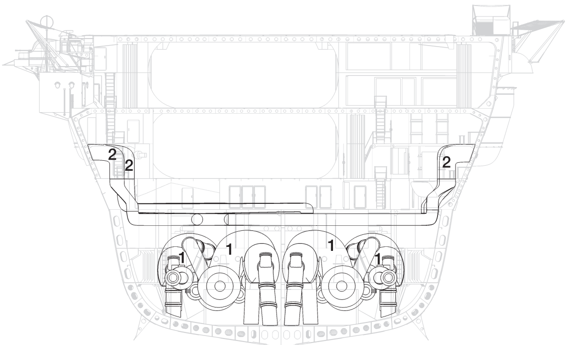
B1/23





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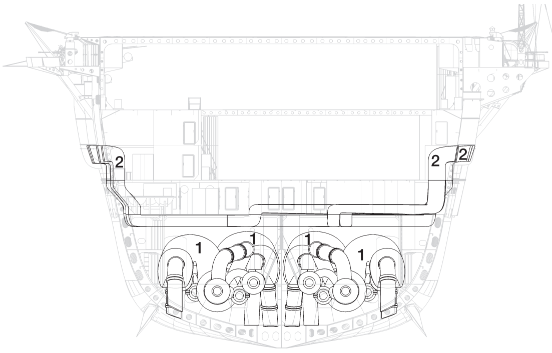

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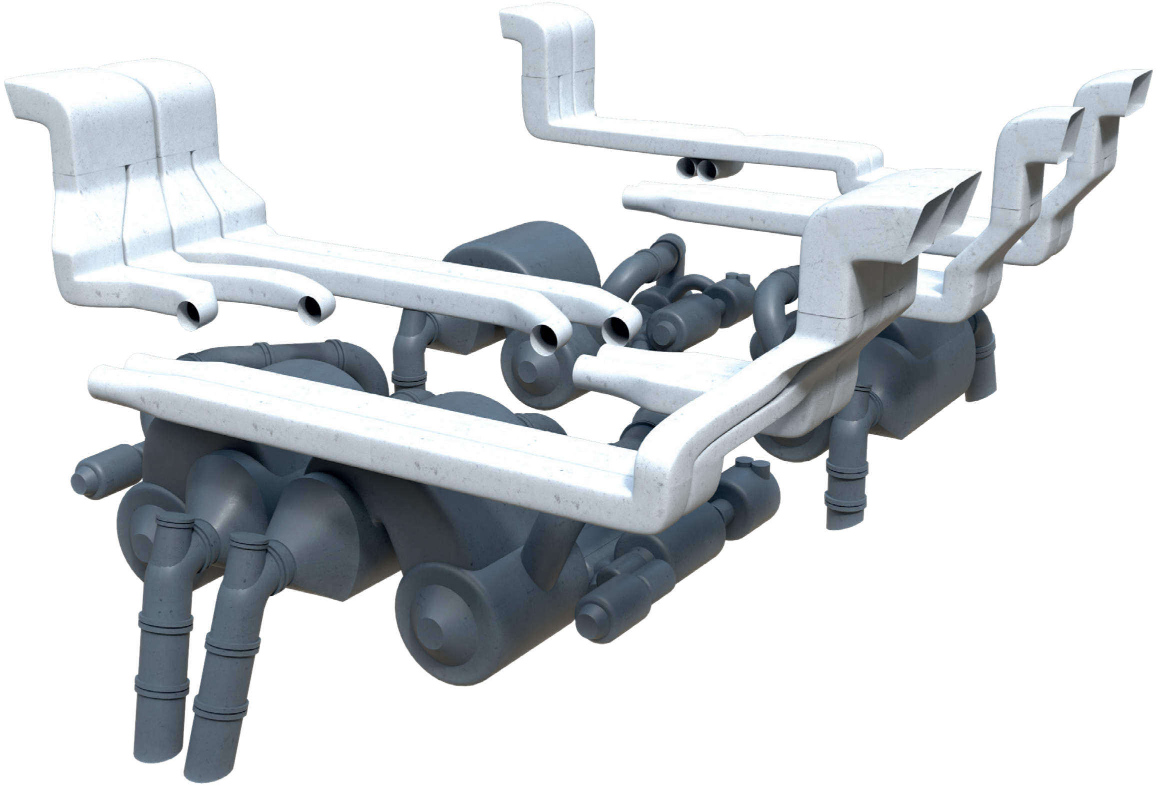


GENERAL ARRANGEMENTS OF AMMUNITION HOISTS AND ORDNANCE ELEVATORS (1/500 SCALE)

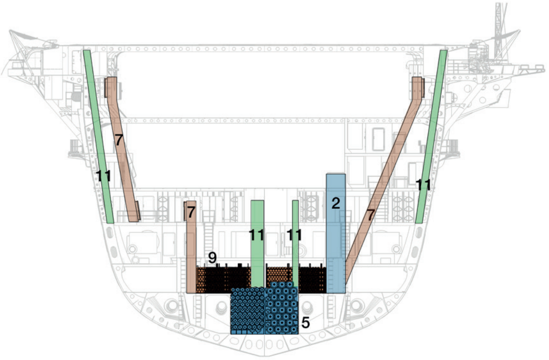
B1/26 RIGHT PROFILE

B1/27 PLAN

B1/28 VIEW FROM FRAME 165 LOOKING AFT

B1/29 VIEW FROM FRAME 100 LOOKING FORWARD

B1/30 VIEW FROM FRAME 80 LOOKING FORWARD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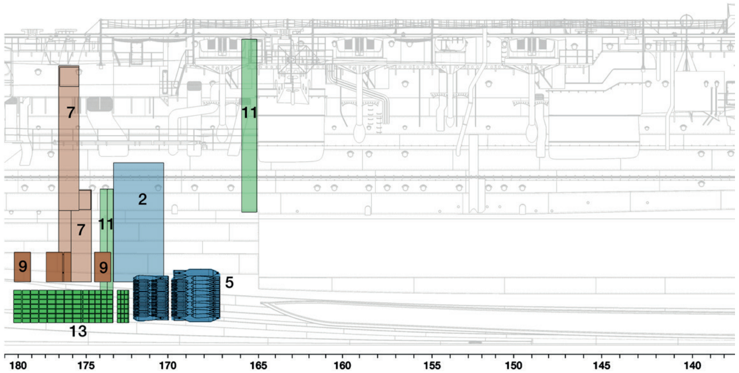
B1/28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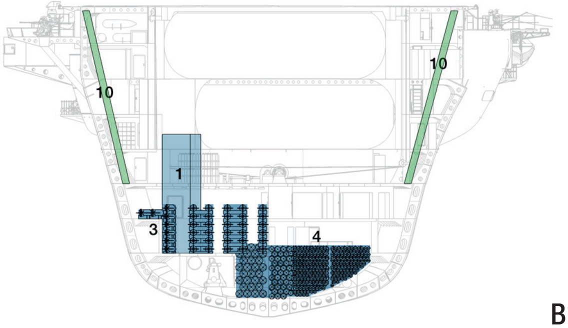
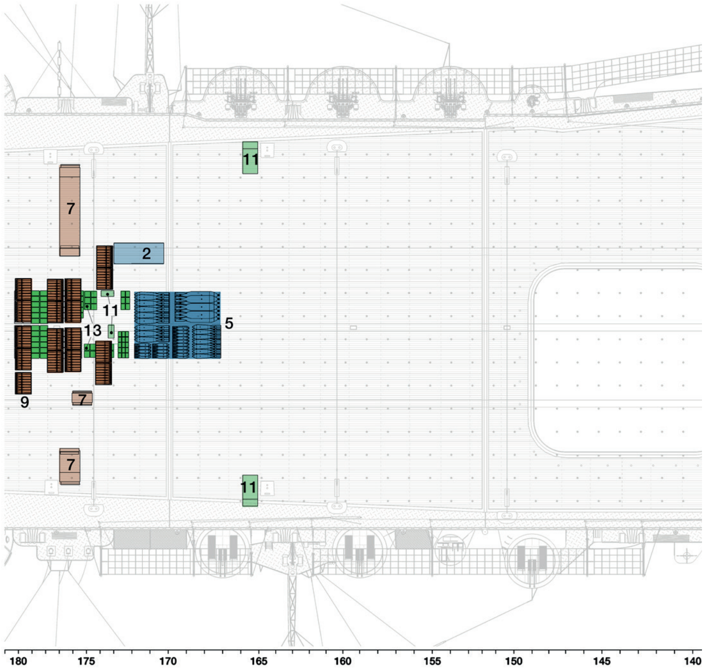
B1/26



B1/29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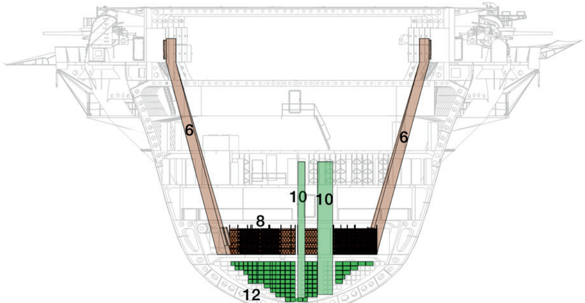
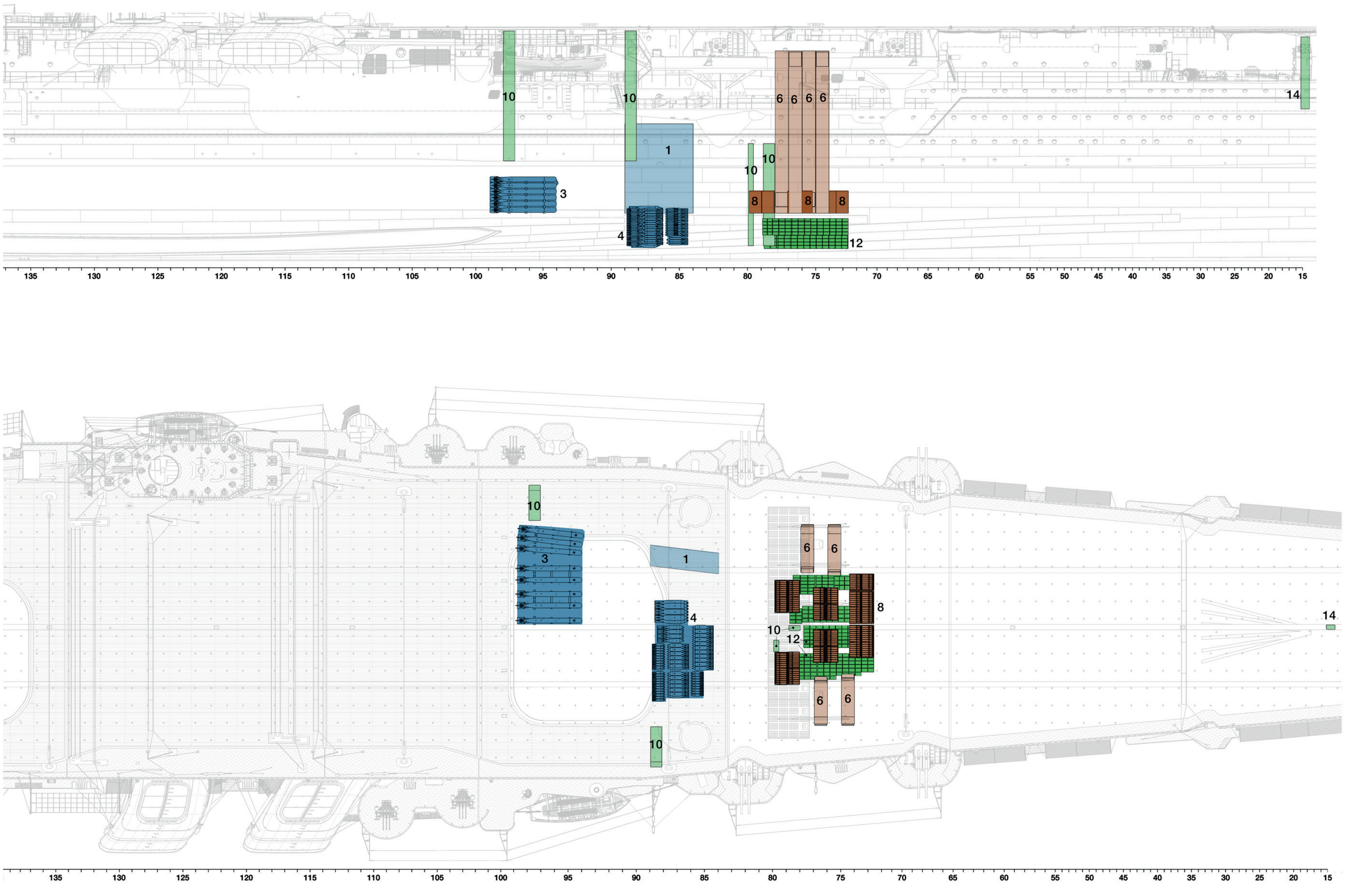
B1/27



B1/30

1/26–30 GENERAL ARRANGEMENTS OF AMMUNITION HOISTS AND ORDNANCE ELEVATORS

1 Torpedo and bomb elevator trunk
2 Aft bomb elevator trunk
3 Torpedo magazine
4 Fore bomb magazine
5 Aft bomb magazine
6 Fore 12.7cm ammunition hoist
7 Aft 12.7cm ammunition hoist
8 Fore 12.7cm ammunition magazine
9 Aft 12.7cm ammunition magazine
10 Fore 25mm ammunition hoist
11 Aft 25mm ammunition hoist
12 Fore 25mm ammunition magazine
13 Aft 25mm ammunition magazine
14 Forecastle 25mm ammunition hoist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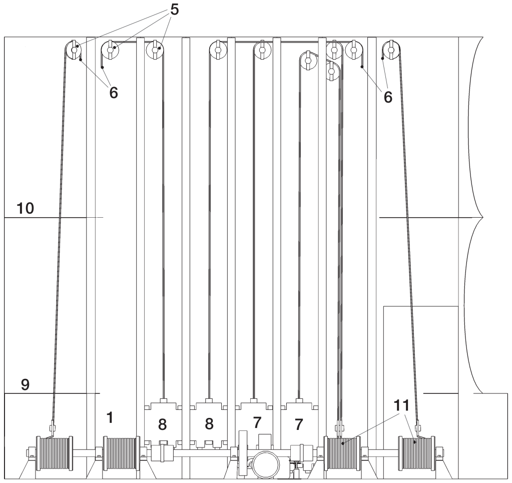
GENERAL ARRANGEMENTS OF AIRCRAFT ELEVATOR TRUNK (1/200 SCALE)

B1/31 TRUNK OF ELEVATOR NO. 1 – INTERNAL PROFILE
B1/32 ELEVATOR PLATFORM NO. 1 – PROFILE
B1/33 TRUNK OF ELEVATOR NO. 1 – FRONT VIEW
B1/34 TRUNK OF ELEVATOR NO. 1 – PLAN

B1/31–34 GENERAL ARRANGEMENTS OF AIRCRAFT ELEVATOR TRUNK

1 Elevator pit
2 Elevator motor room
3 Elevator platform
4 Carbon dioxide bottles
5 Pulley
6 Elevator platform attachment point
7 Large counterweight
8 Small counterweight
9 Lower hangar floor
10 Upper hangar floor
11 Wire rope reel



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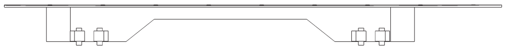
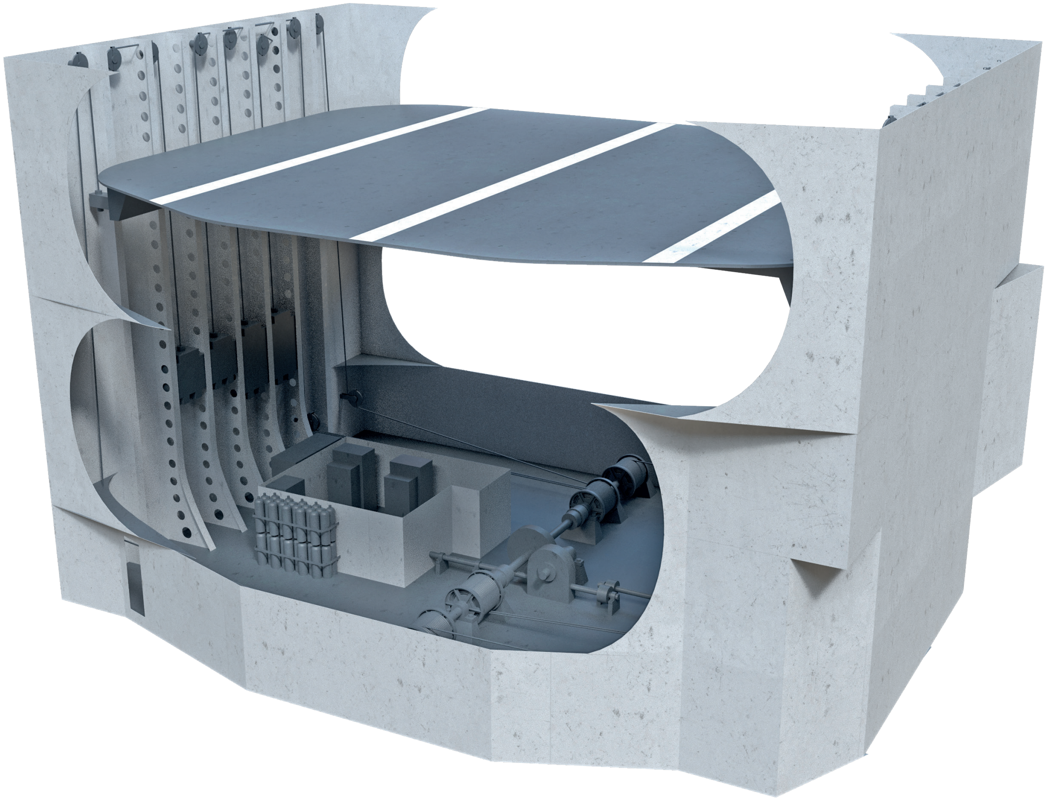
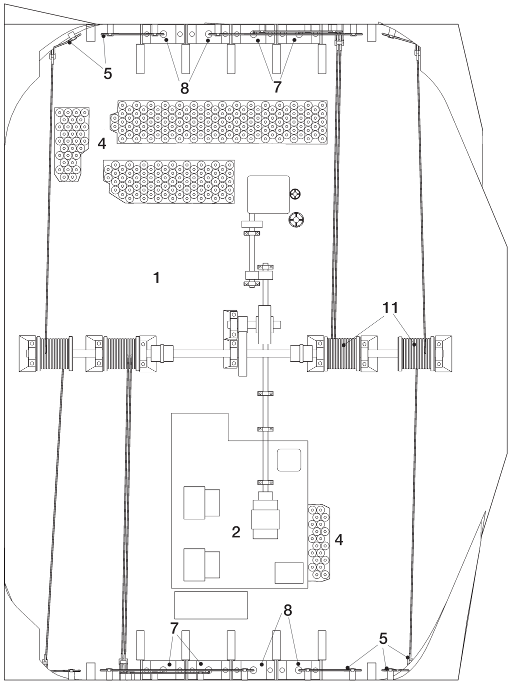


B1/32



Elevator platform shown half-way between the flight deck and upper hangar floor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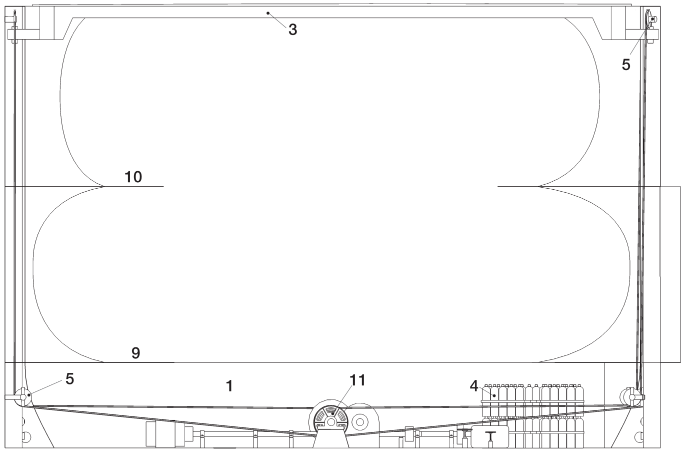
B1/34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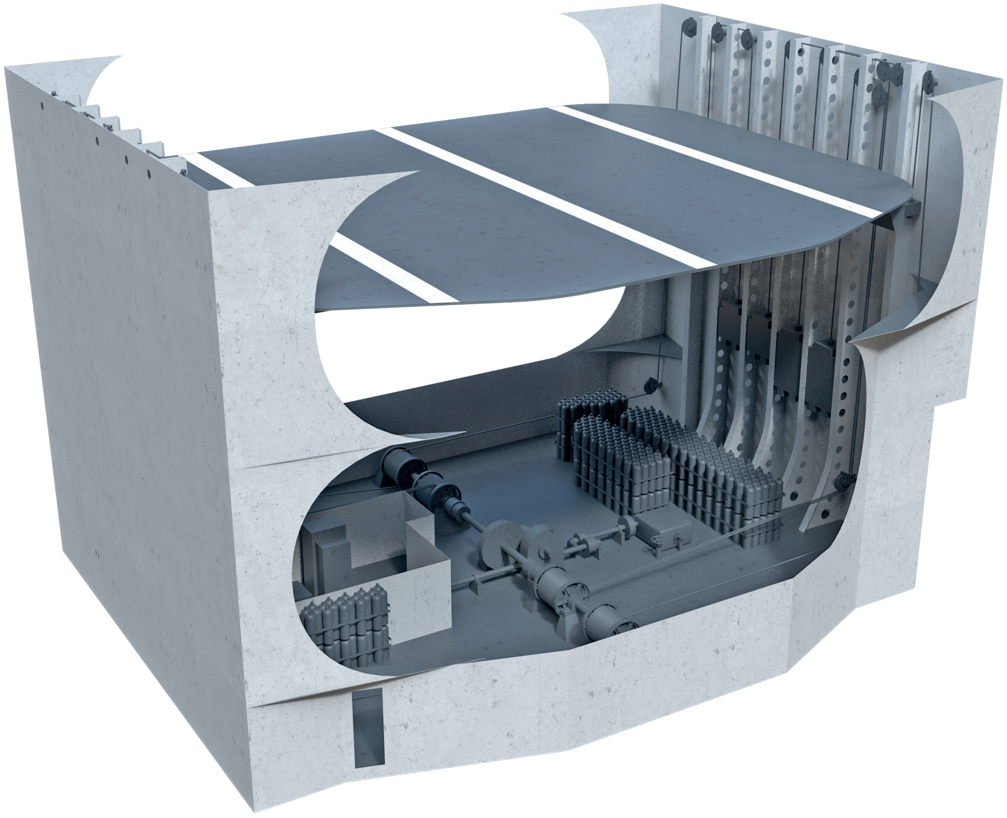
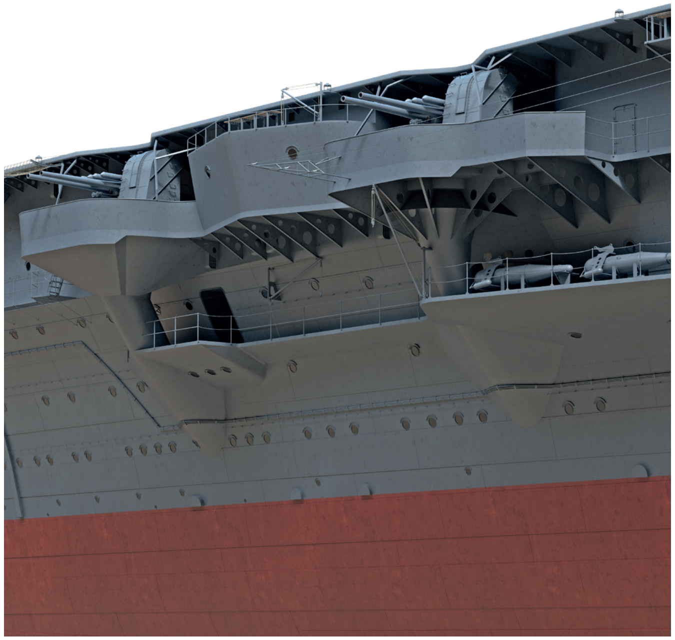
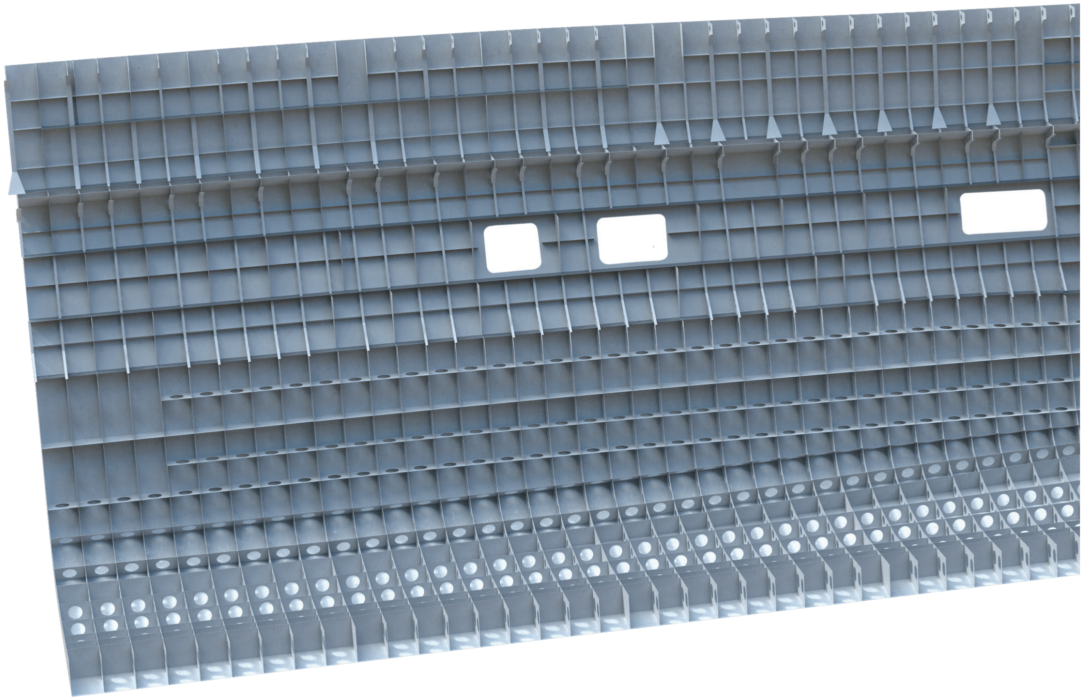
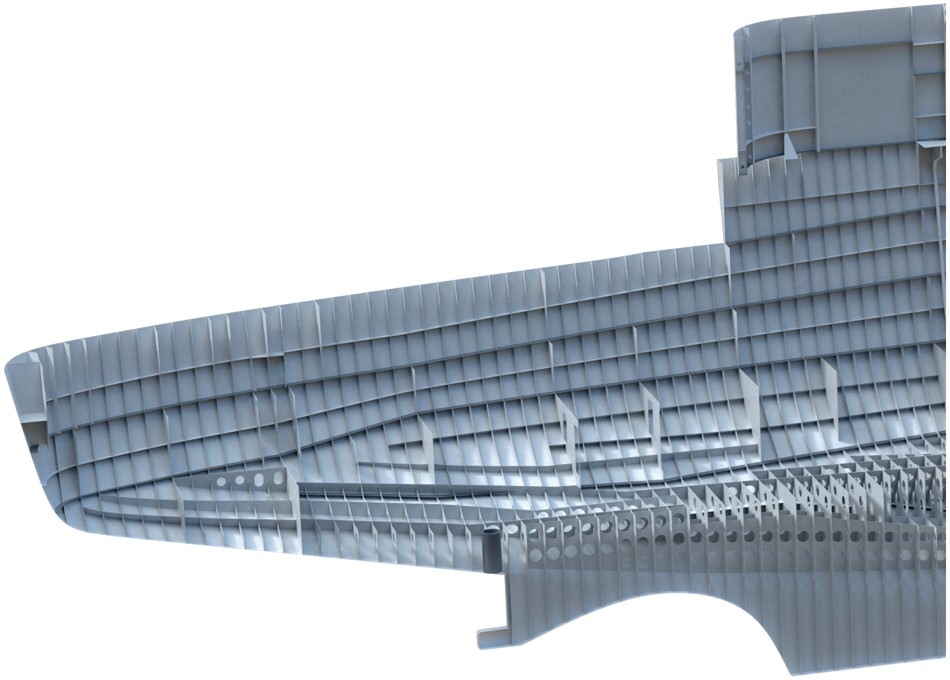
B1/33

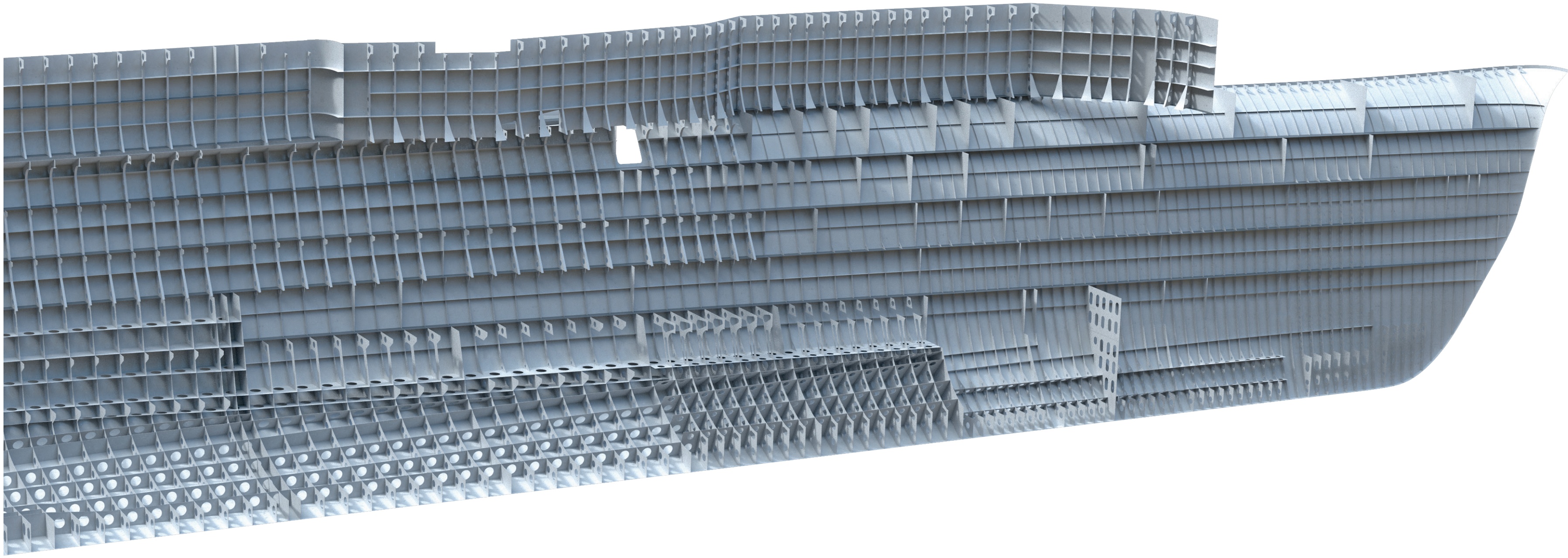


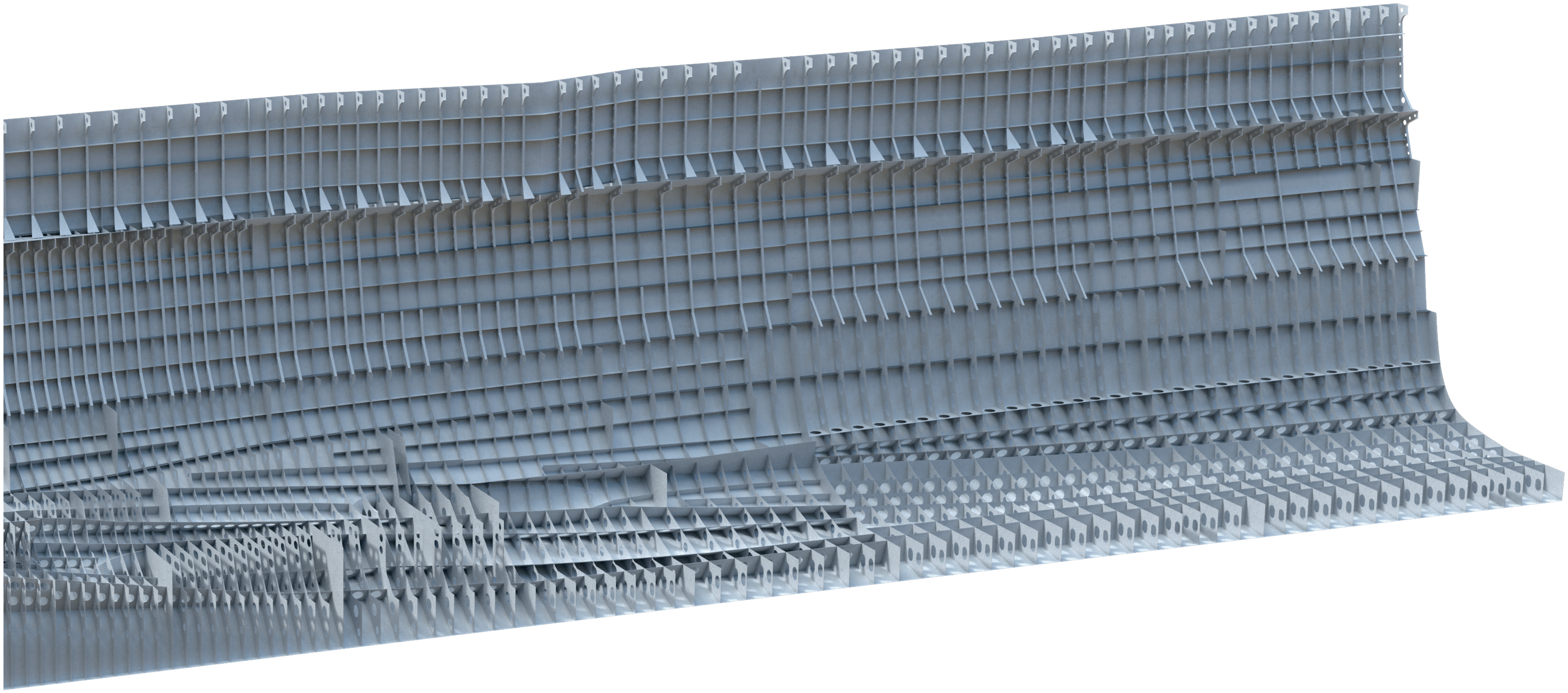


Hull framing and double bottom







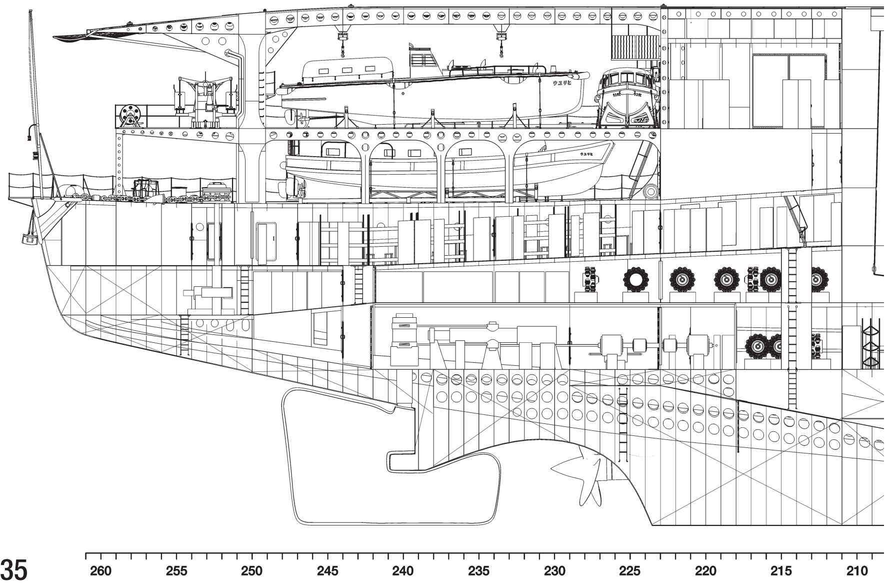


B1/35 INTERNAL PROFILE, FRAMES 135–261 (1/300 SCALE)

B1/36 INTERNAL PROFILE, FRAMES 0–135 (1/300 SCALE)

B1/35–36 INTERNAL PROFILE

1. Flight deck level (飛行甲板平面 – hikōkōban heimen)
2. High-angle gun and machine gun deck level (高角砲・機銃甲板平面 – kōkakuhō kijū kanpan heimen)
3. Top deck level (最上甲板平面 – saijō kanpan heimen)
4. Upper deck level (上甲板平面 – jō kanpan heimen)
5. Middle deck level (中甲板平面 – chū kanpan heimen)
6. Lower deck level (下甲板平面 – ge kanpan heimen)
7. Bottom deck level (最下甲板平面 – saika kanpan heimen)
8. Tank deck level (船倉甲板平面 – sensō kanpan heimen)
9. Lower tank deck level (船倉平面 – sensō heimen)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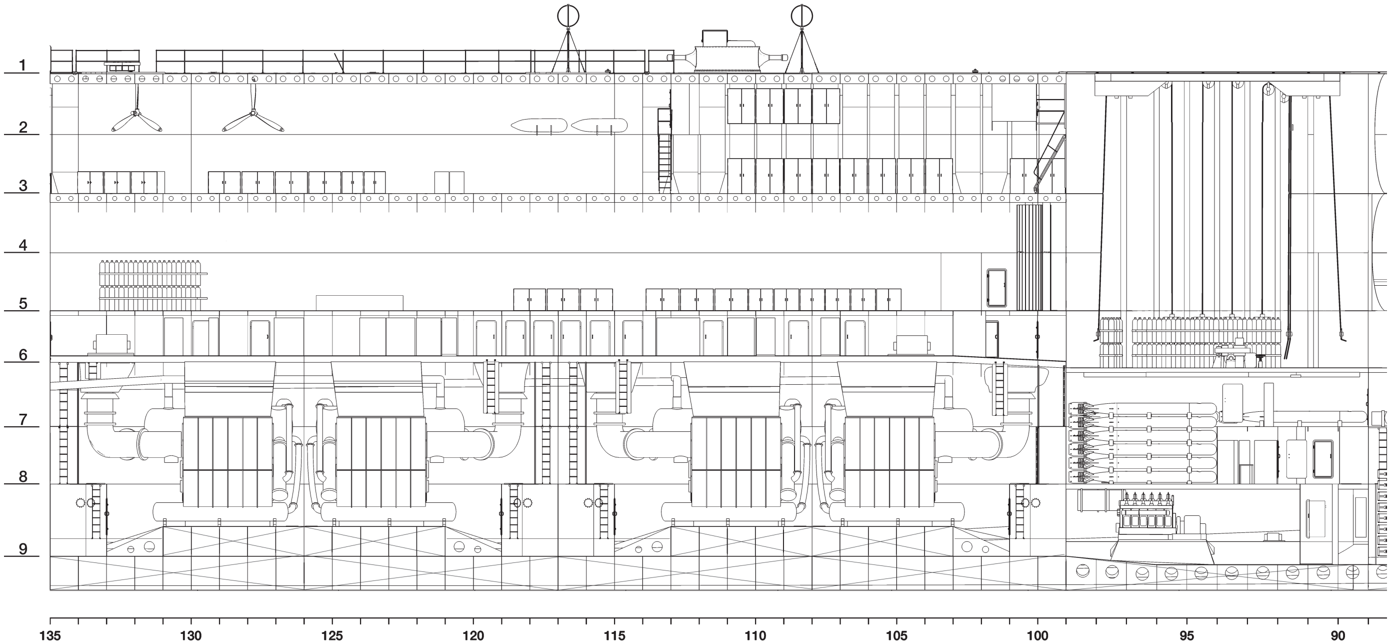
B1/35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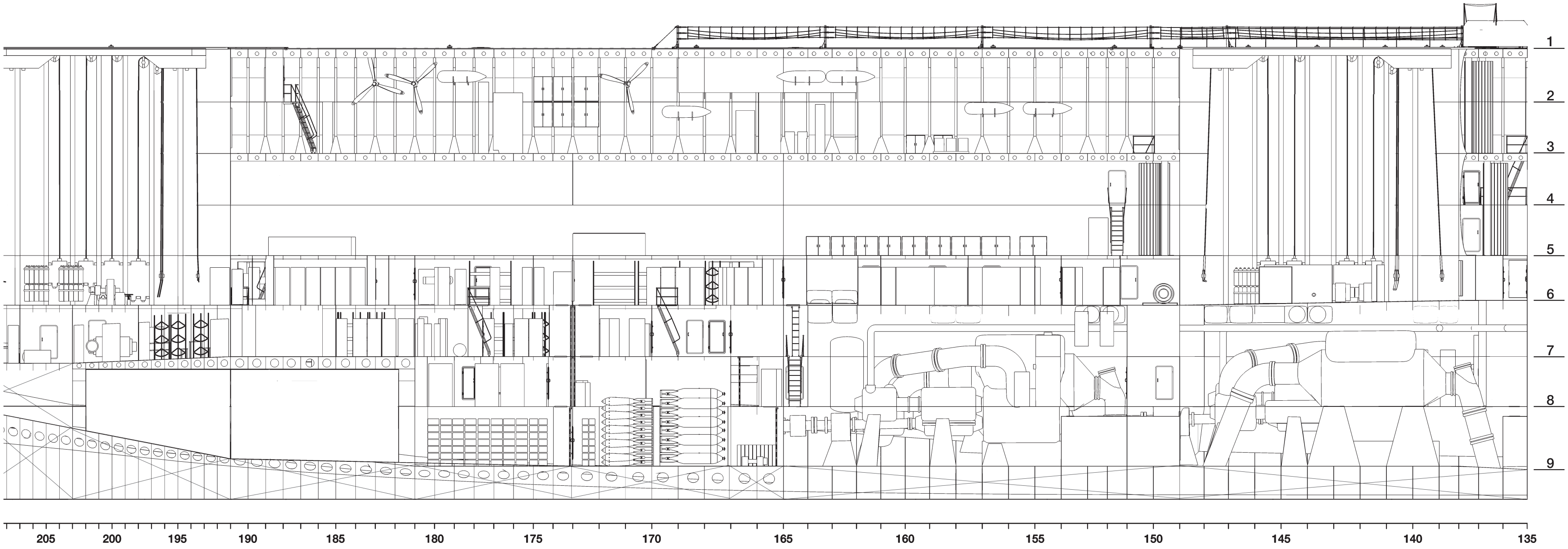
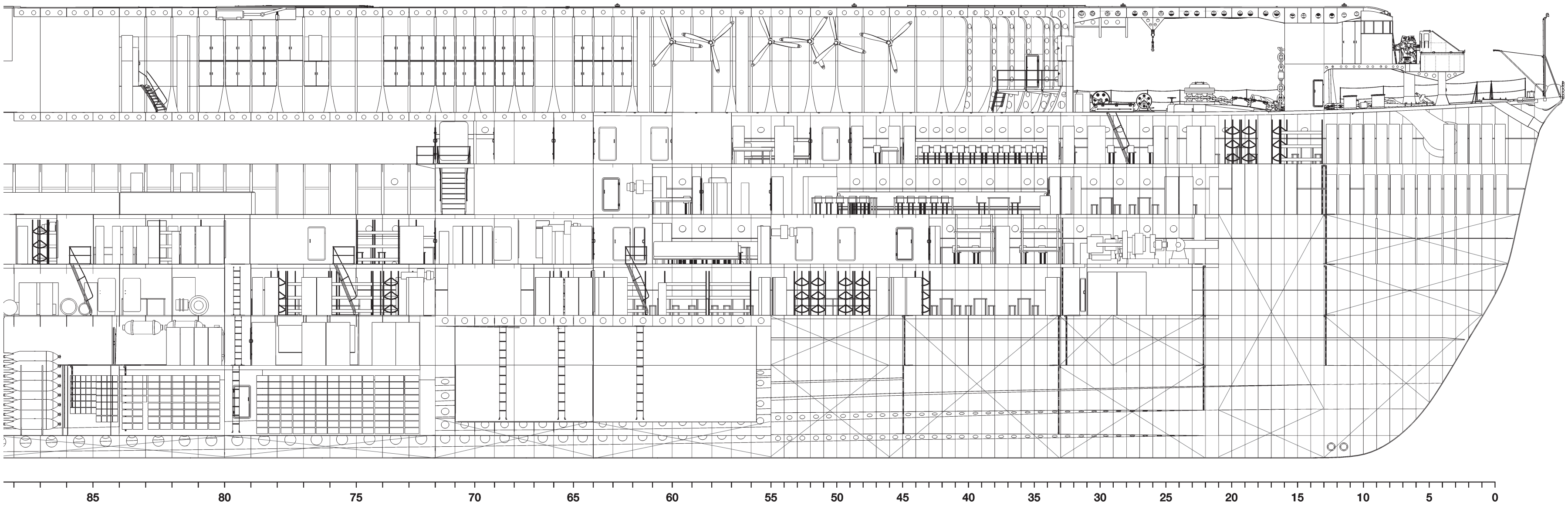
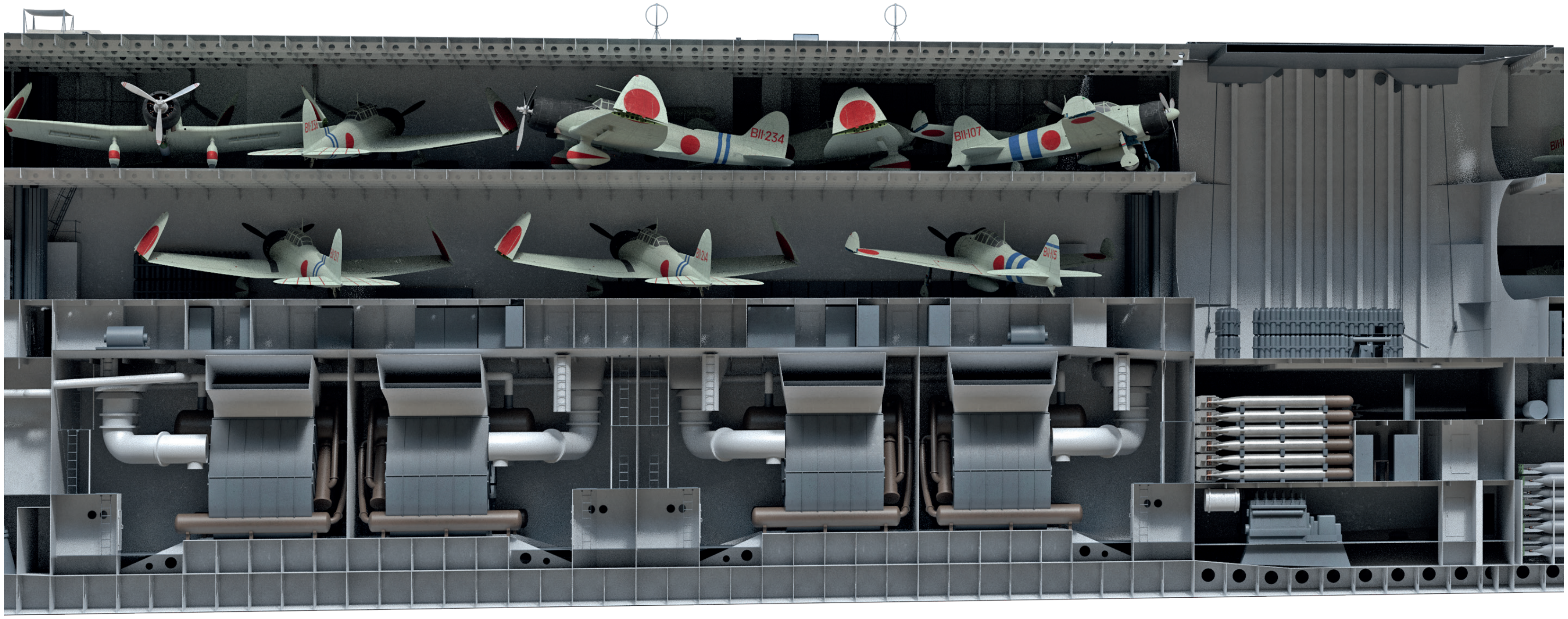
B1/36



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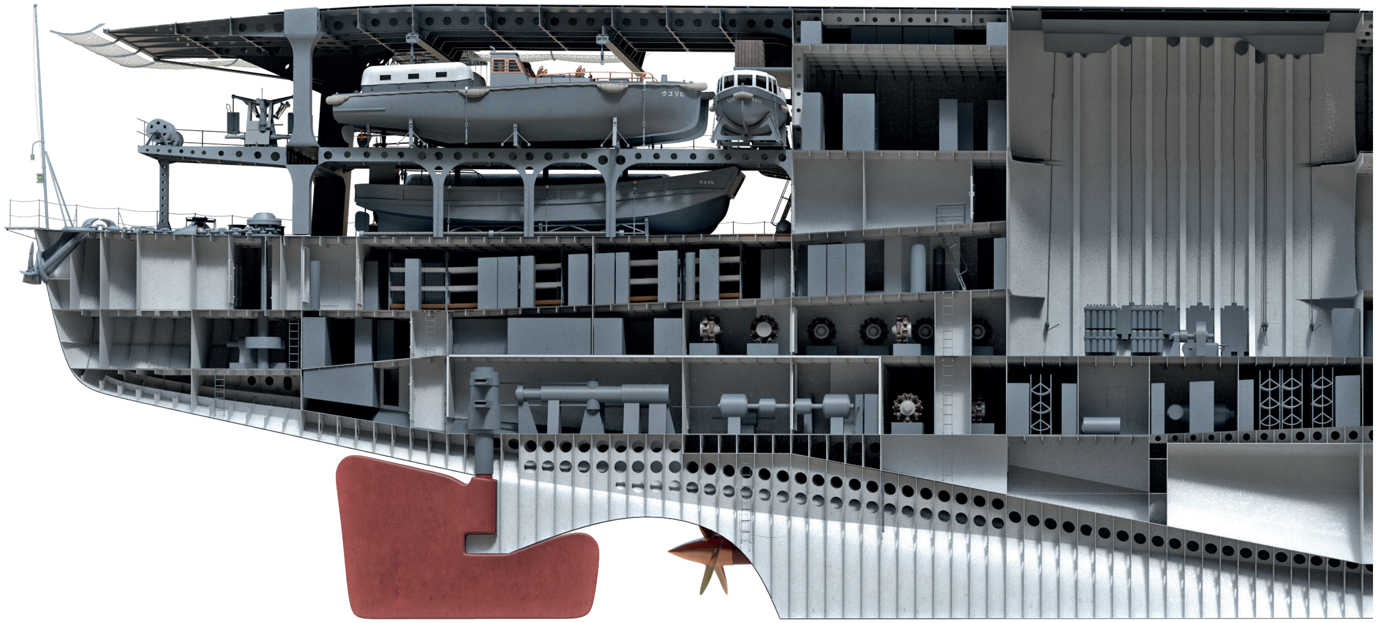

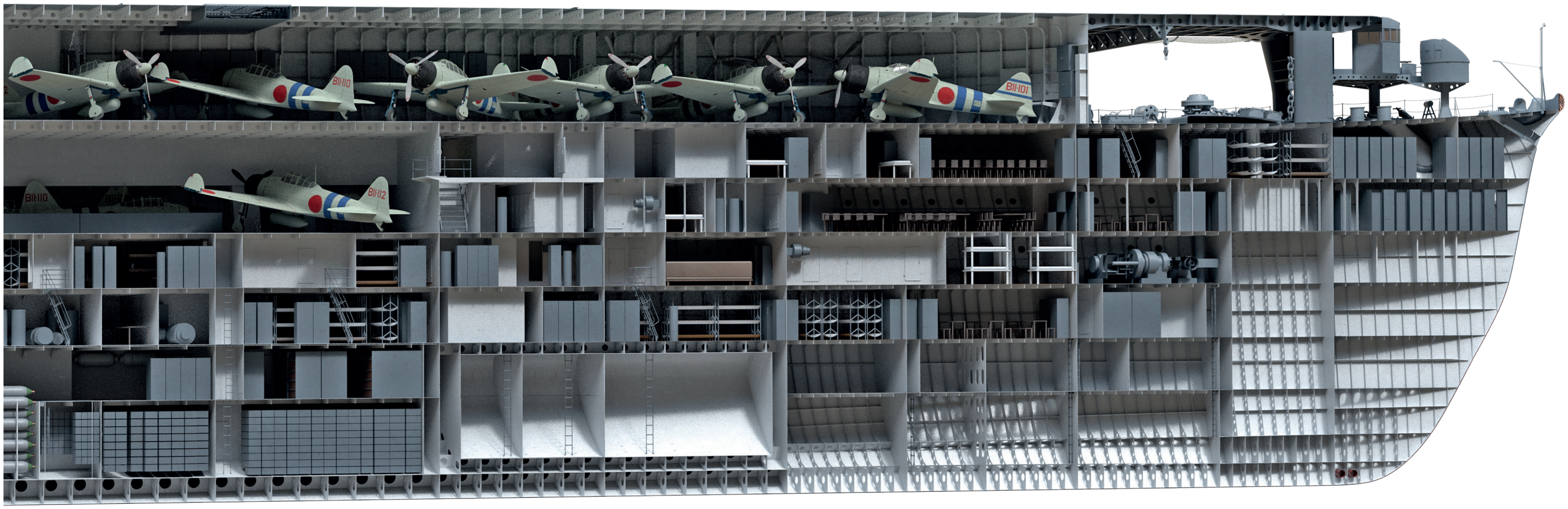
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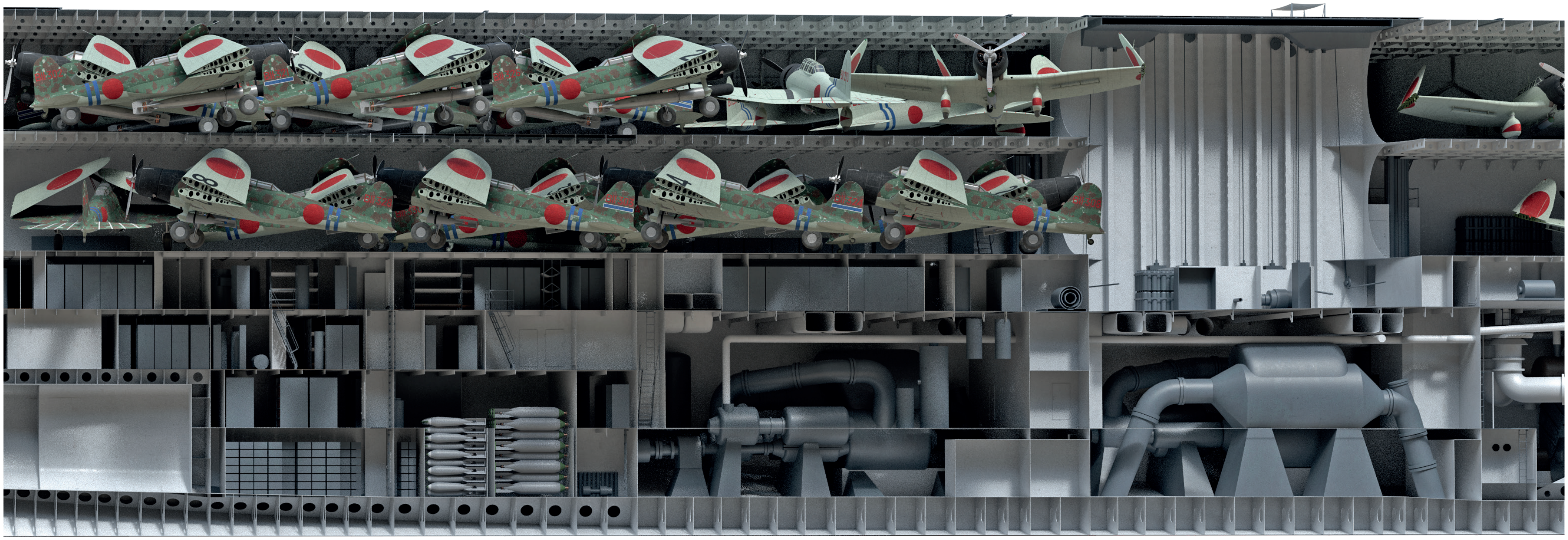


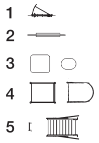
DECK PLANS (1/300 SCALE)

B2/1 ELEMENTS REPEATING IN ALL DECK PLANS

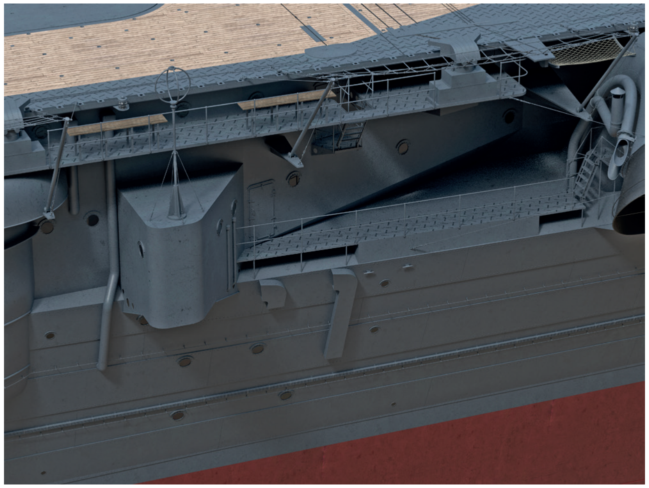
1 Door
2 Passage through bulkhead
3 Hatches to deck below
4 Hatchways to deck below
5 Ladders to deck above

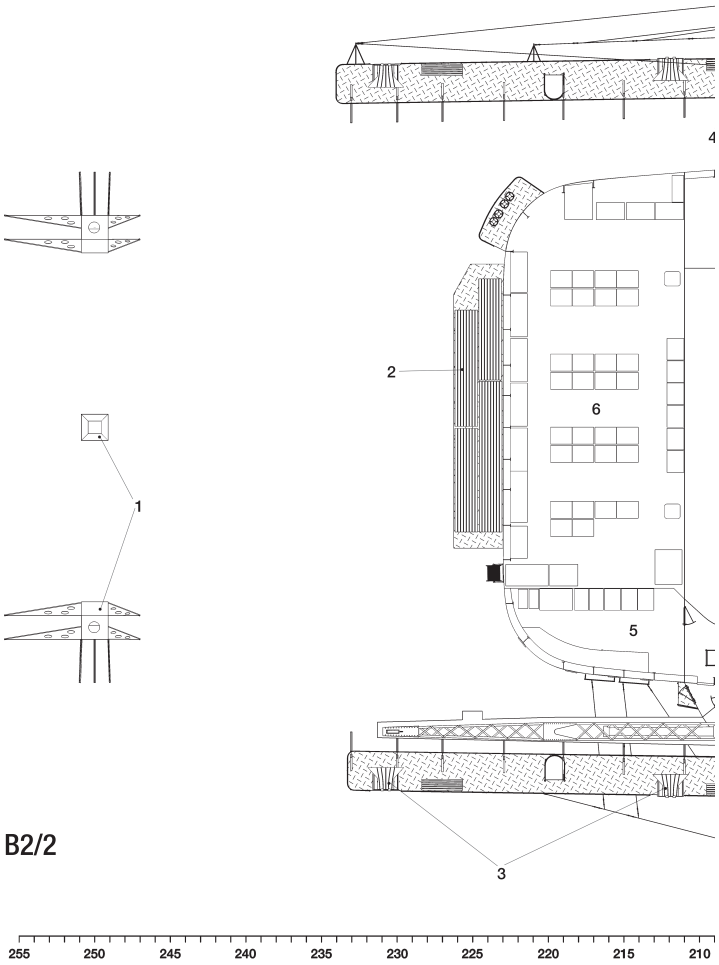
B2/2 HIGH-ANGLE GUN AND MACHINE GUN DECK, FRAMES 135–261

1 Flight deck supports
2 Timber storage platform
3 Deck illuminating light
4 Bench
5 Radio coordination room
6 Maintenance division storage room
7 110cm searchlight well
8 Deck crane motor room (crane shown in stowed position)
9 Aft elevator control room
10 Communication division storage room
11 Battery charging room
12 Wire antenna mast (shown in raised position)
13 Landing-aid light system
14 12.7cm gun mount no. 5
15 12.7cm gun mount no. 6
16 25mm gun mount no. 7 (twin shielded)
17 25mm gun mount no. 8 (triple)
18 25mm gun mount no. 9 (twin shielded)
19 25mm gun mount no. 10 (triple)
20 25mm gun mount no. 11 (twin shielded)
21 25mm gun mount no. 12 (triple)
22 Type 95 director
23 12.7cm ammunition handling room
24 12.7cm ammunition hoist
25 25mm ammunition hoist
26 Direction finder loop antenna
27 25mm ammunition locker
28 Middle elevator control room
29 Small bomb storage room
30 Flight division storage room
31 Fire protection bulkhead motor room
32 Fire protection bulkhead (shown in rolled position)
33 Middle elevator trunk
34 Aft elevator trunk
35 Spare aircraft parts storage room
36 Stowed spare aircraft propeller
37 Stowed spare aircraft fuel tank
38 Wire antenna tube platform above starboard side 12.7cm ammunition handling room
39 Upper aircraft hangar (aft section)



B2/1





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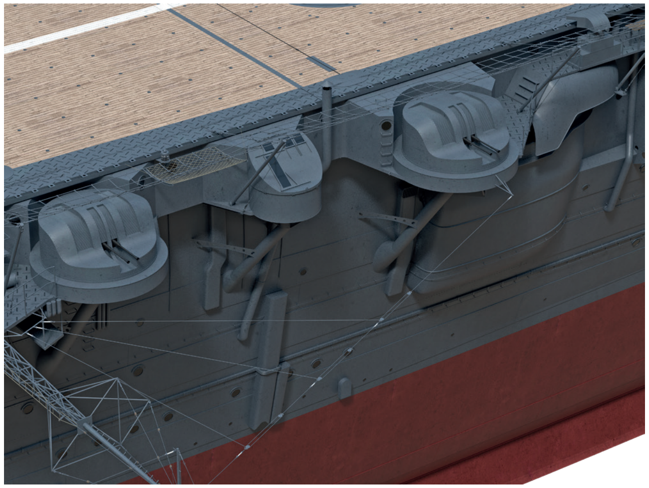

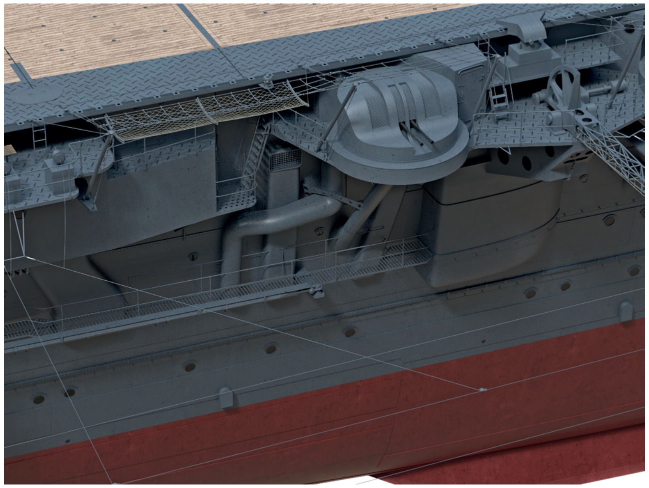

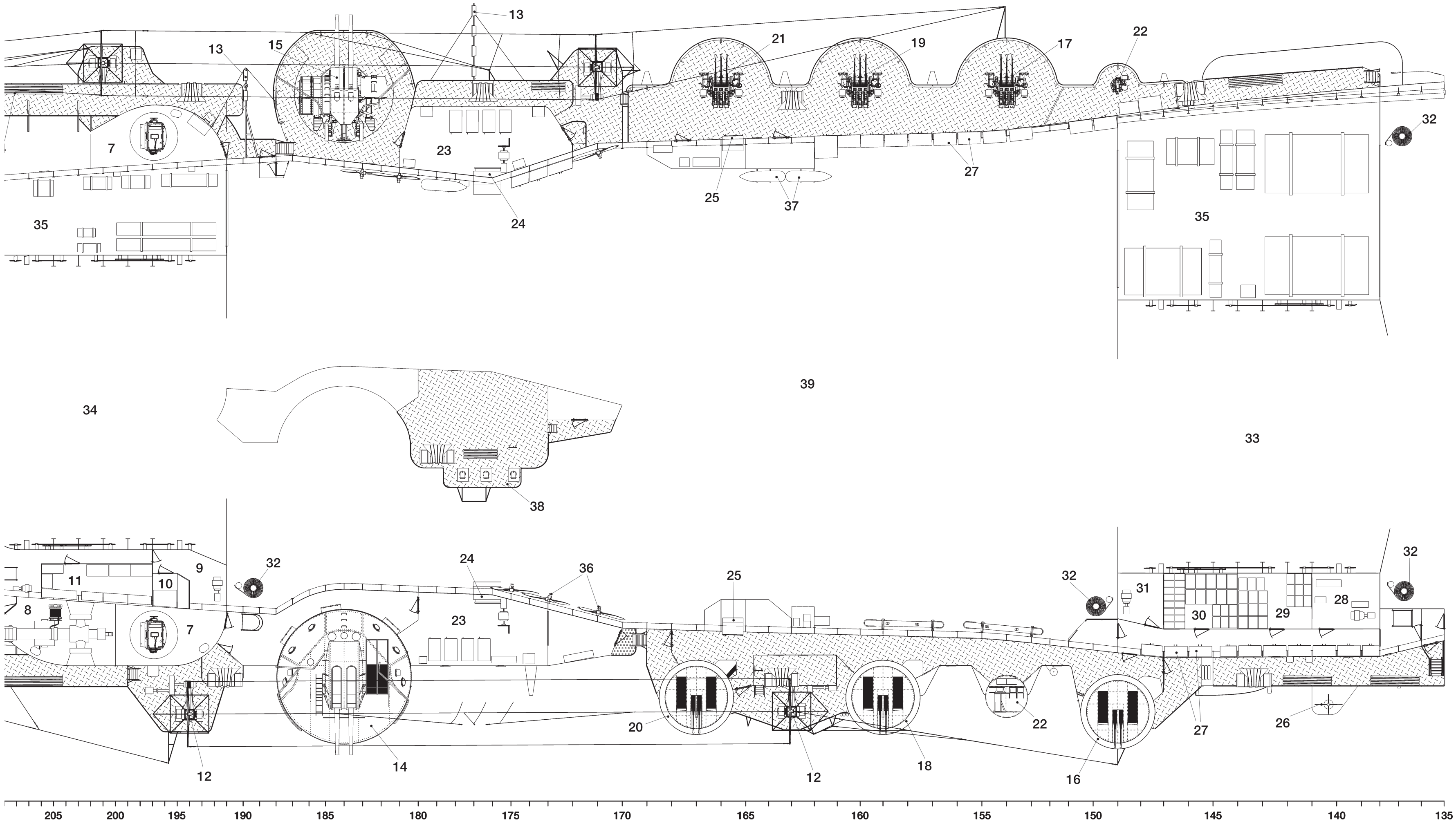
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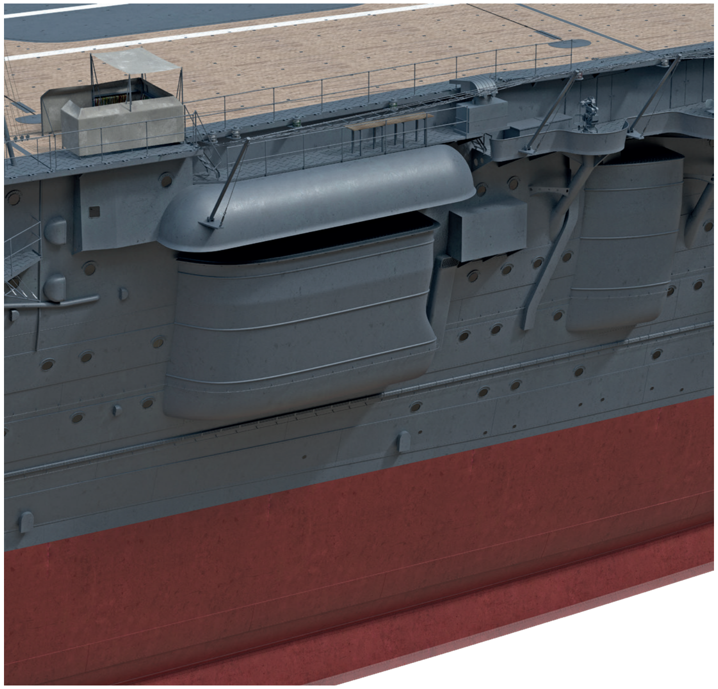
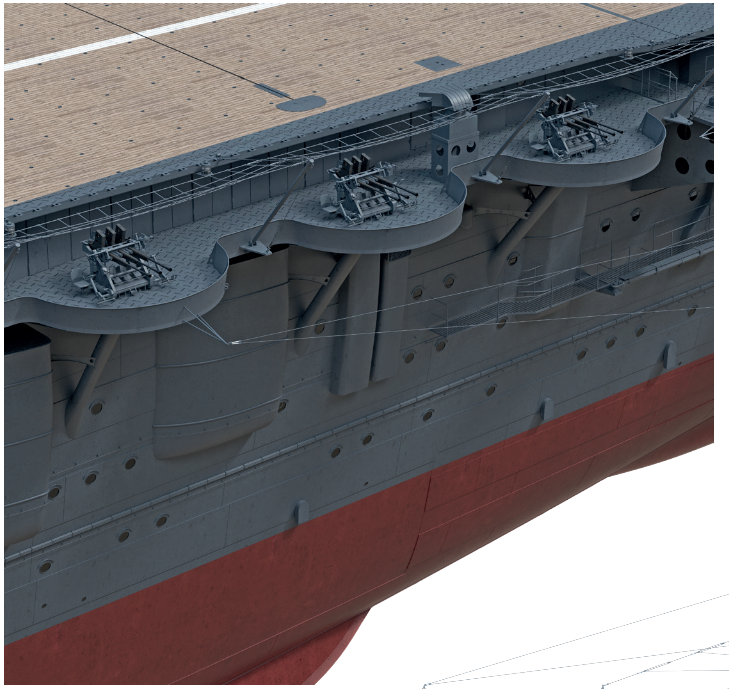
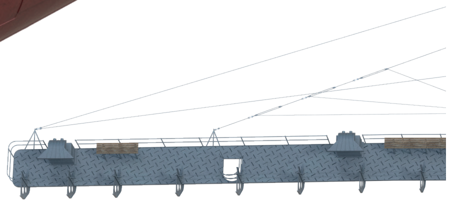
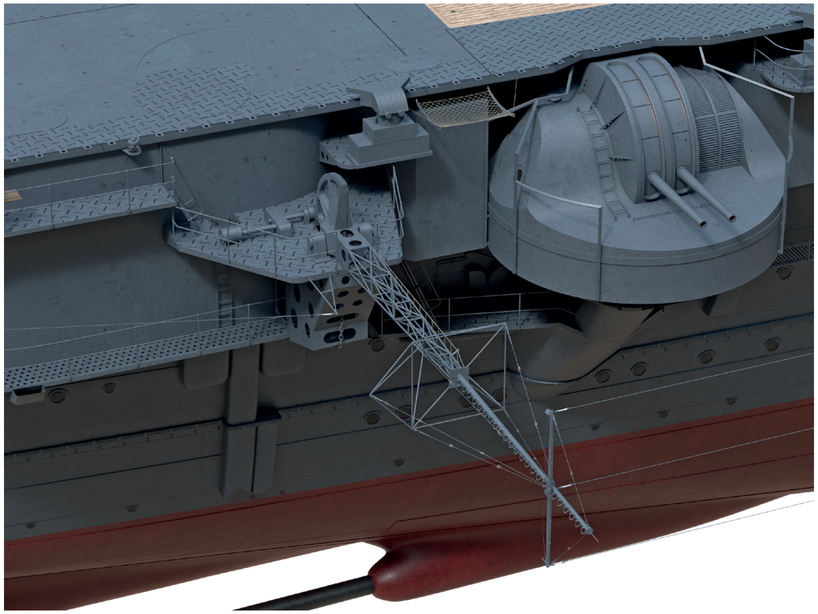
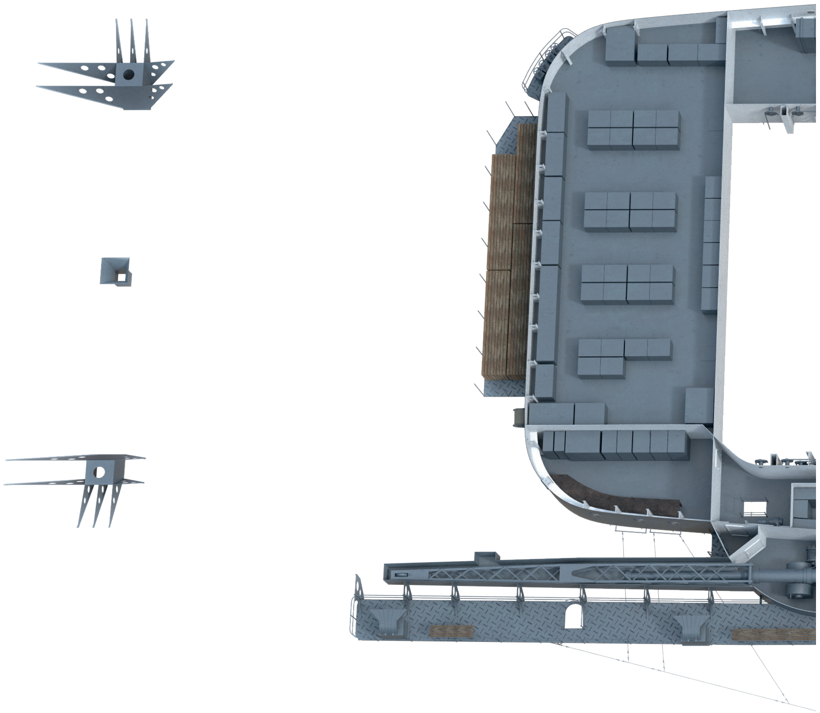
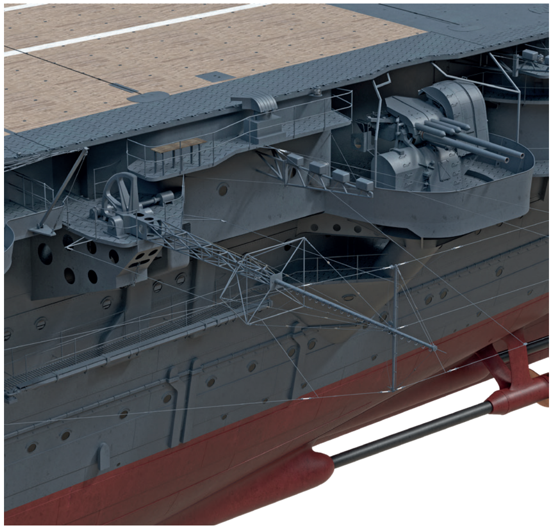


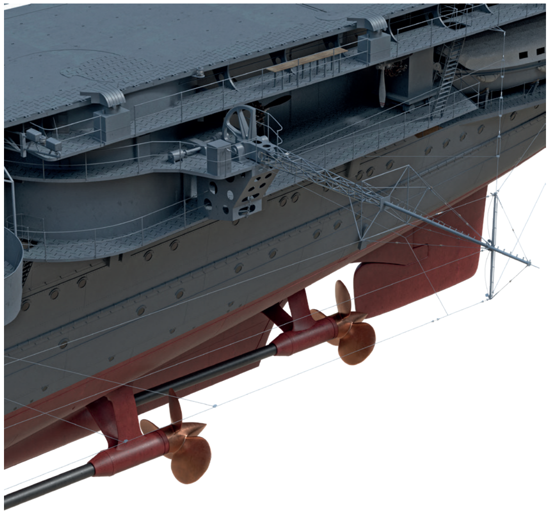


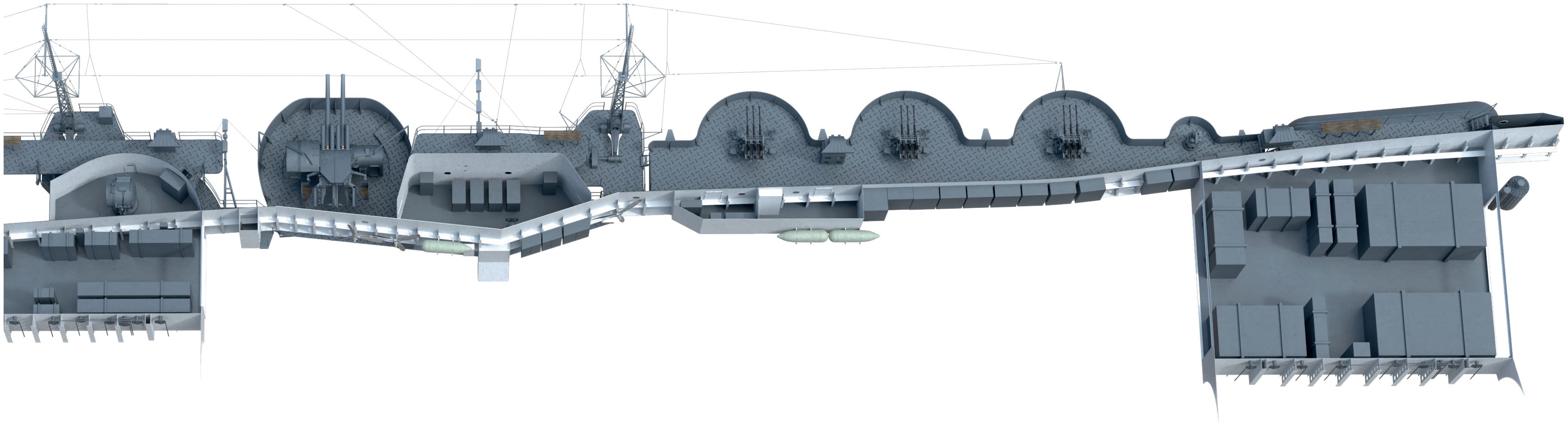


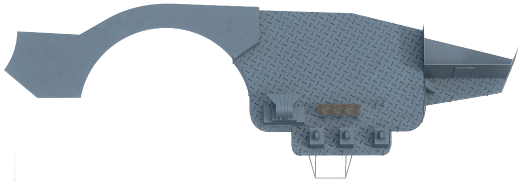


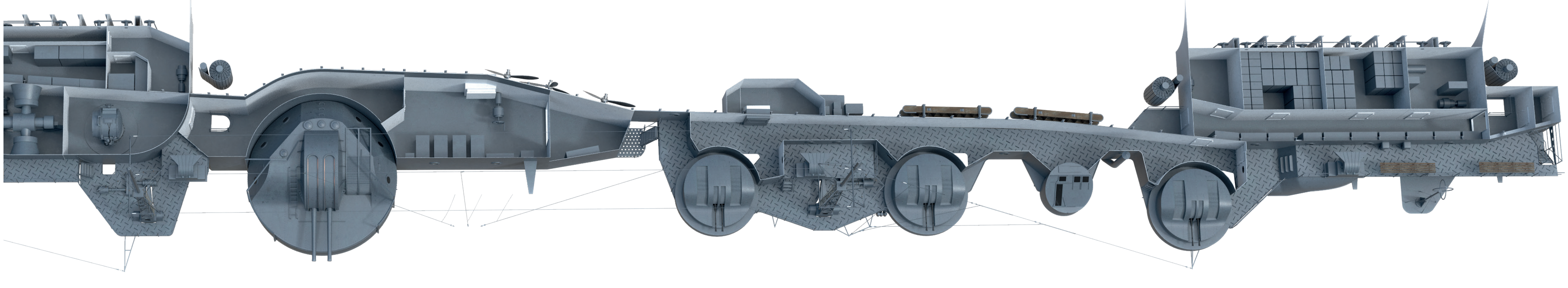










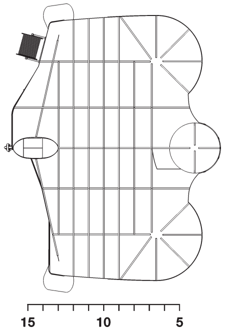


DECK PLANS (1/300 SCALE)

B2/3 HIGH-ANGLE GUN AND MACHINE GUN DECK, FRAMES 0–135

1 Flight deck supports
2 Deck illuminating light
3 Bench
4 110cm searchlight well
5 Landing-aid light system
6 12.7cm gun mount no. 1
7 12.7cm gun mount no. 2
8 12.7cm gun mount no. 3
9 12.7cm gun mount no. 4
10 25mm gun mount no. 1 (twin)
11 25mm gun mount no. 2 (twin)
12 25mm gun mount no. 3 (triple)
13 25mm gun mount no. 4 (triple)
14 25mm gun mount no. 5 (triple)
15 25mm gun mount no. 6 (triple)
16 Type 95 director
17 12.7cm ammunition handling room
18 12.7cm ammunition hoist
19 25mm ammunition hoist
20 25mm ammunition locker
21 Fire protection bulkhead
22 Fore elevator trunk
23 Spare aircraft parts storage room
24 Stowed spare aircraft propeller
25 Stowed spare aircraft fuel tank
26 Platform above 12.7cm ammunition handling room
27 Upper aircraft hangar (fore section)
28 Upper aircraft hangar (middle section)
29 Funnel no. 1
30 Funnel no. 2

B2/4 UNDERSIDE OF THE FORECASTLE GUN PLATFORM



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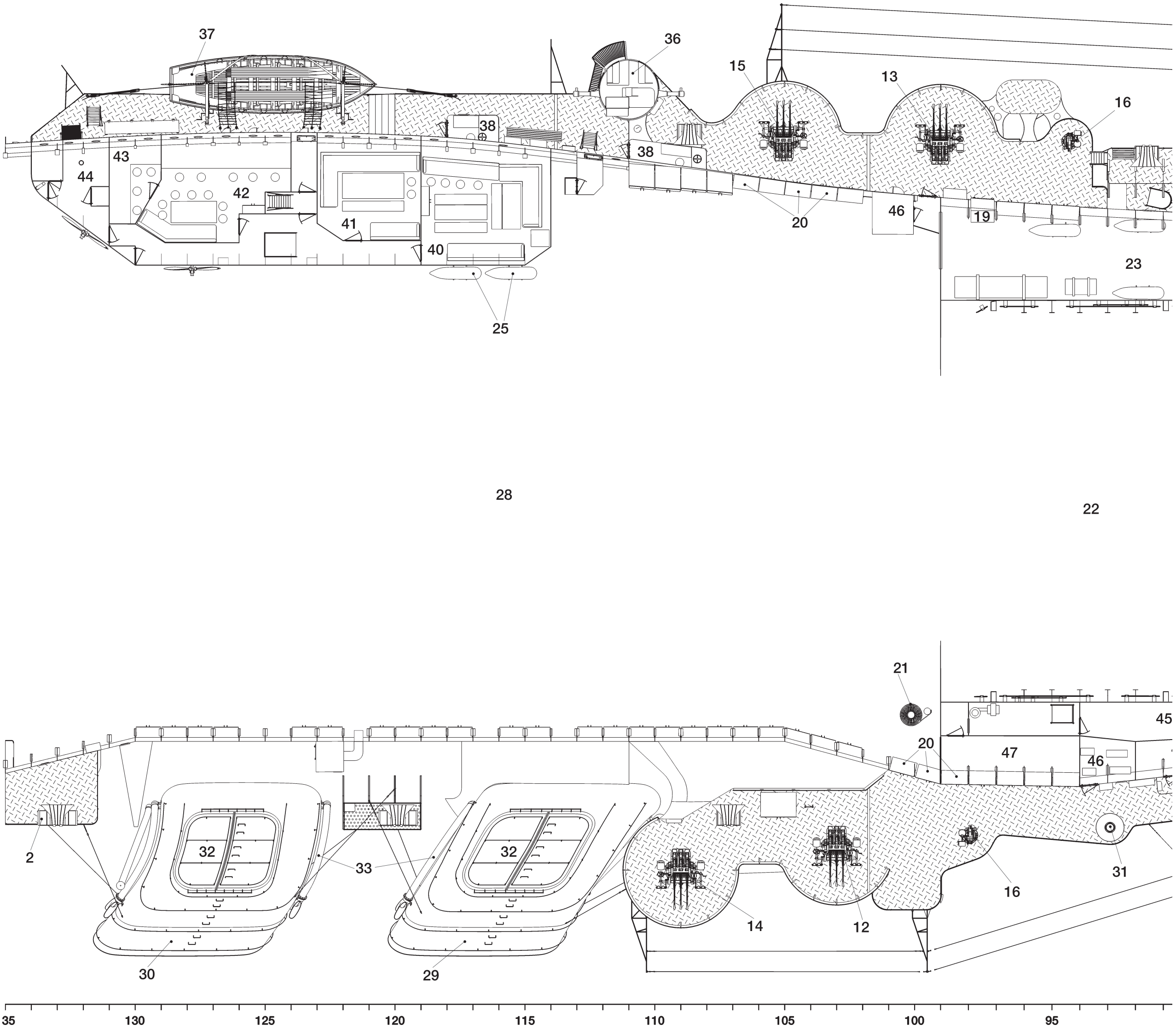
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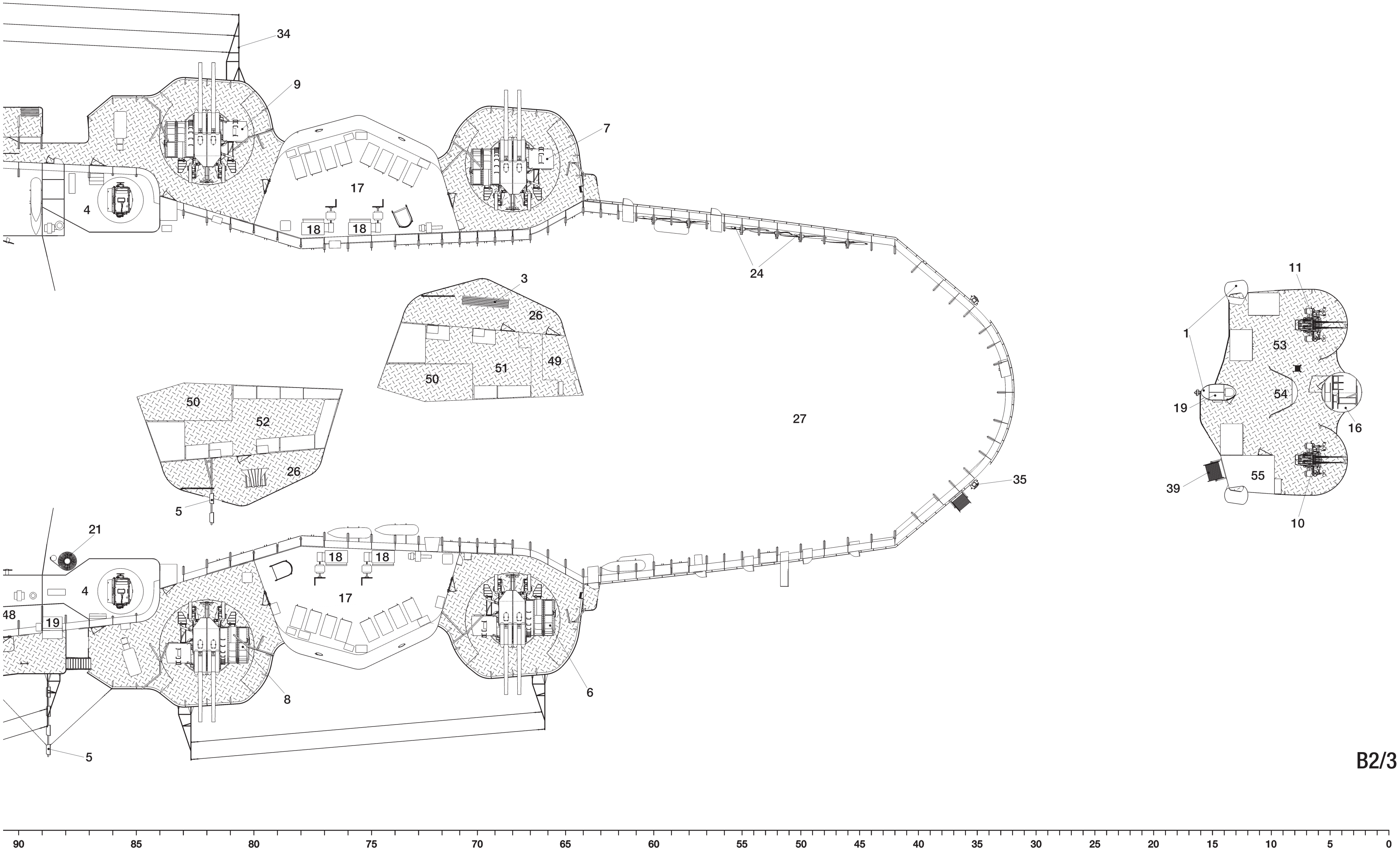
31 Compass
32 Removable funnel cover
33 Steam pipe
34 Wire antenna outrigger
35 Deck light
36 Type 94 director
37 9m cutter in davits
38 Radio direction finder room
39 Reel
40 Flight deck crew's office
41 Flight deck crew's waiting room
42 Communication centre
43 Coding room
44 Toilet
45 Fore elevator control room
46 Storage room
47 Passage
48 25mm ammunition supply station
49 Windscreen control room
50 Windscreen recess
51 Artillery division storage room
52 Maintenance division storage room
53 Forecastle gun platform
54 Lookout post
55 Machine gun crew room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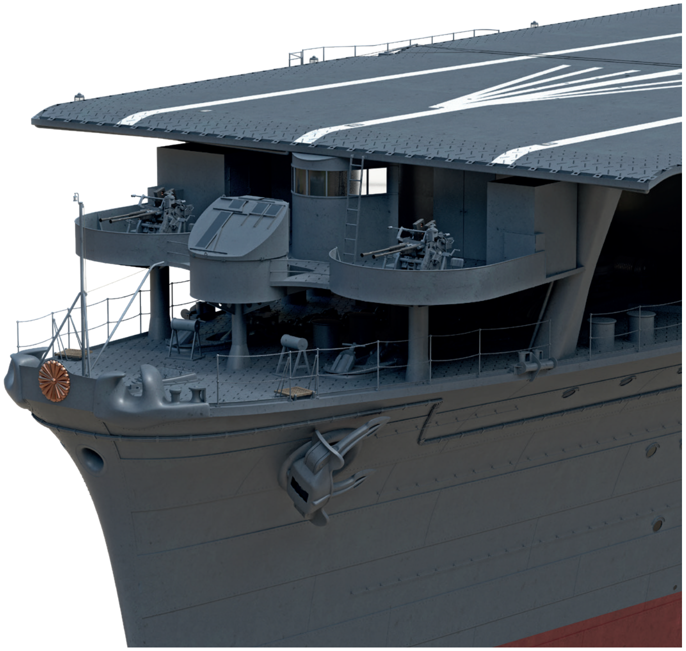
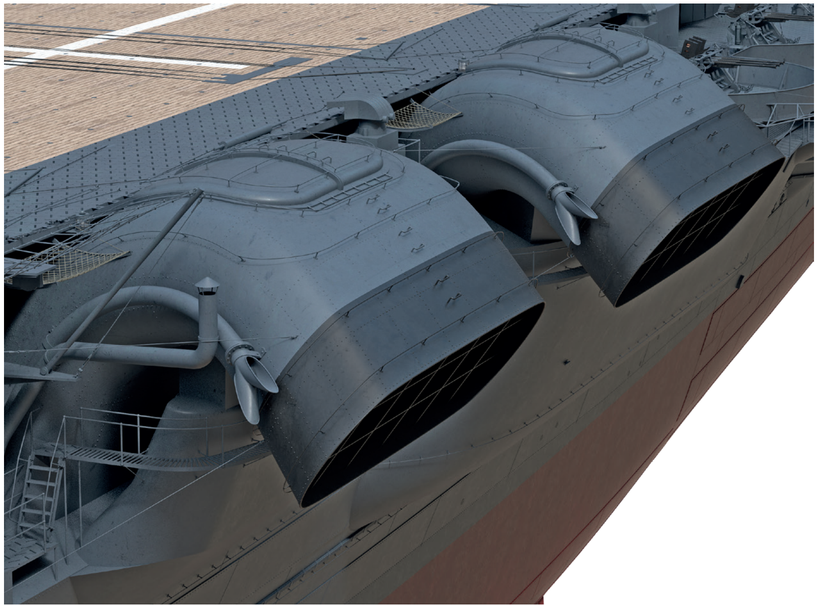
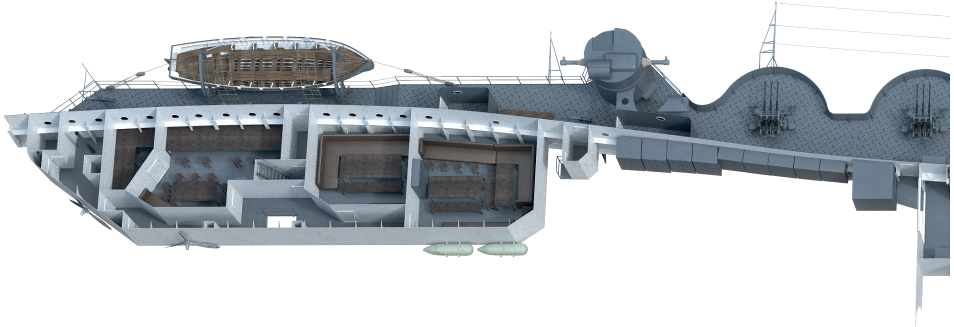
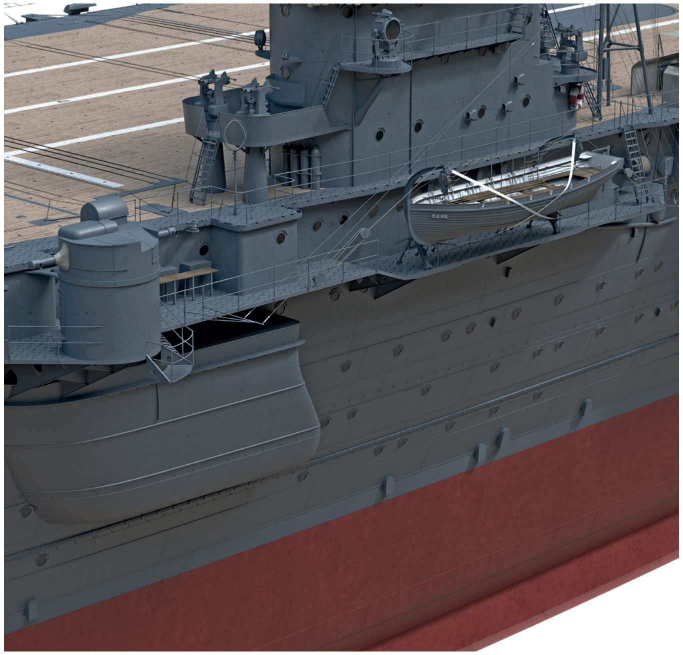
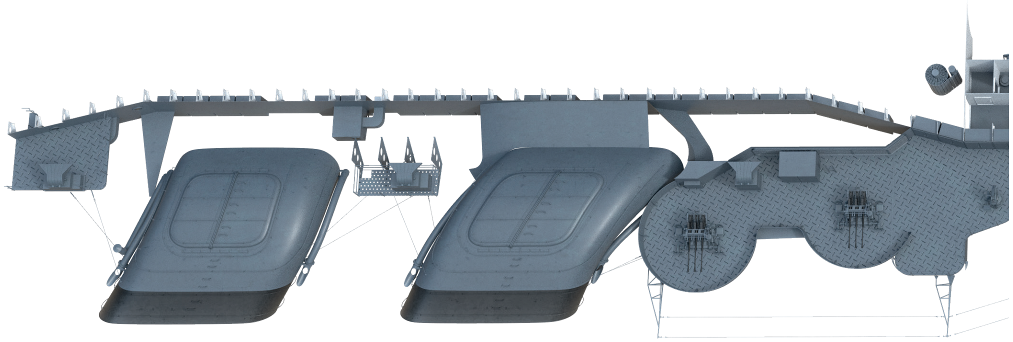
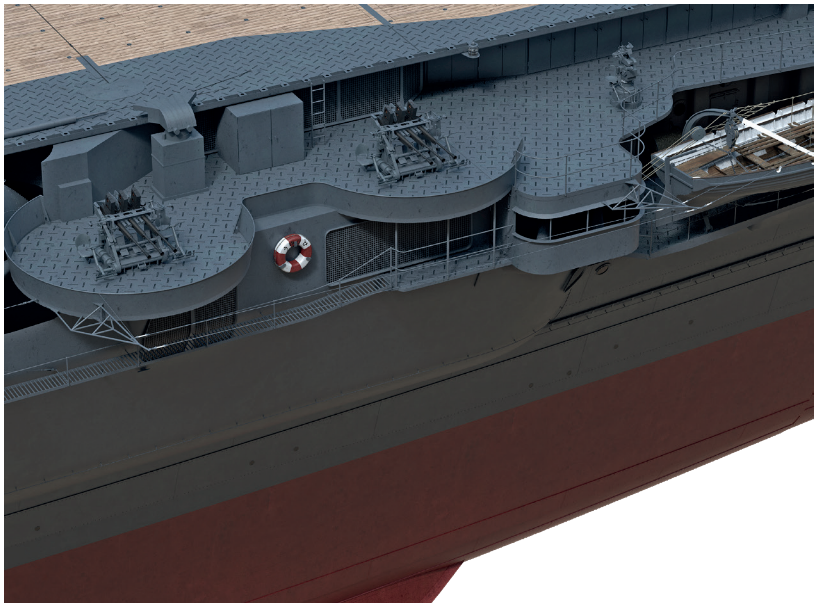


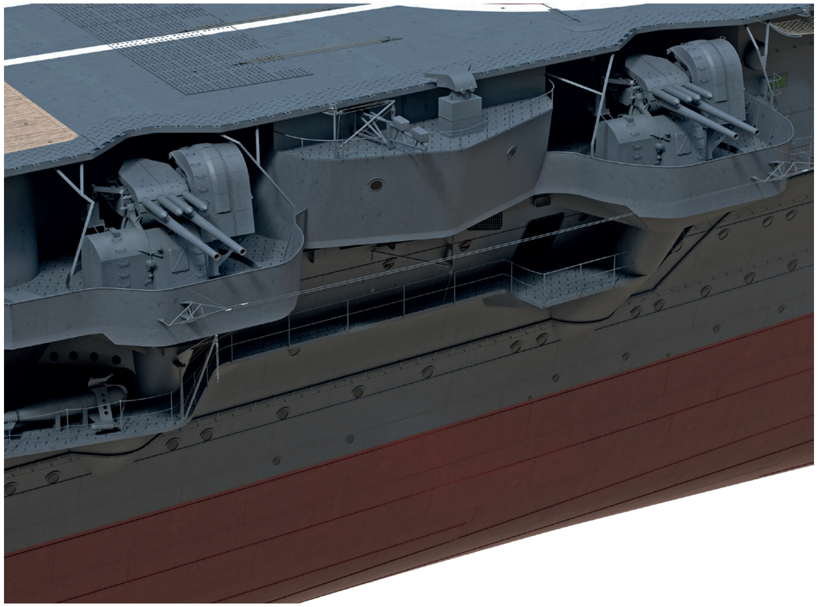


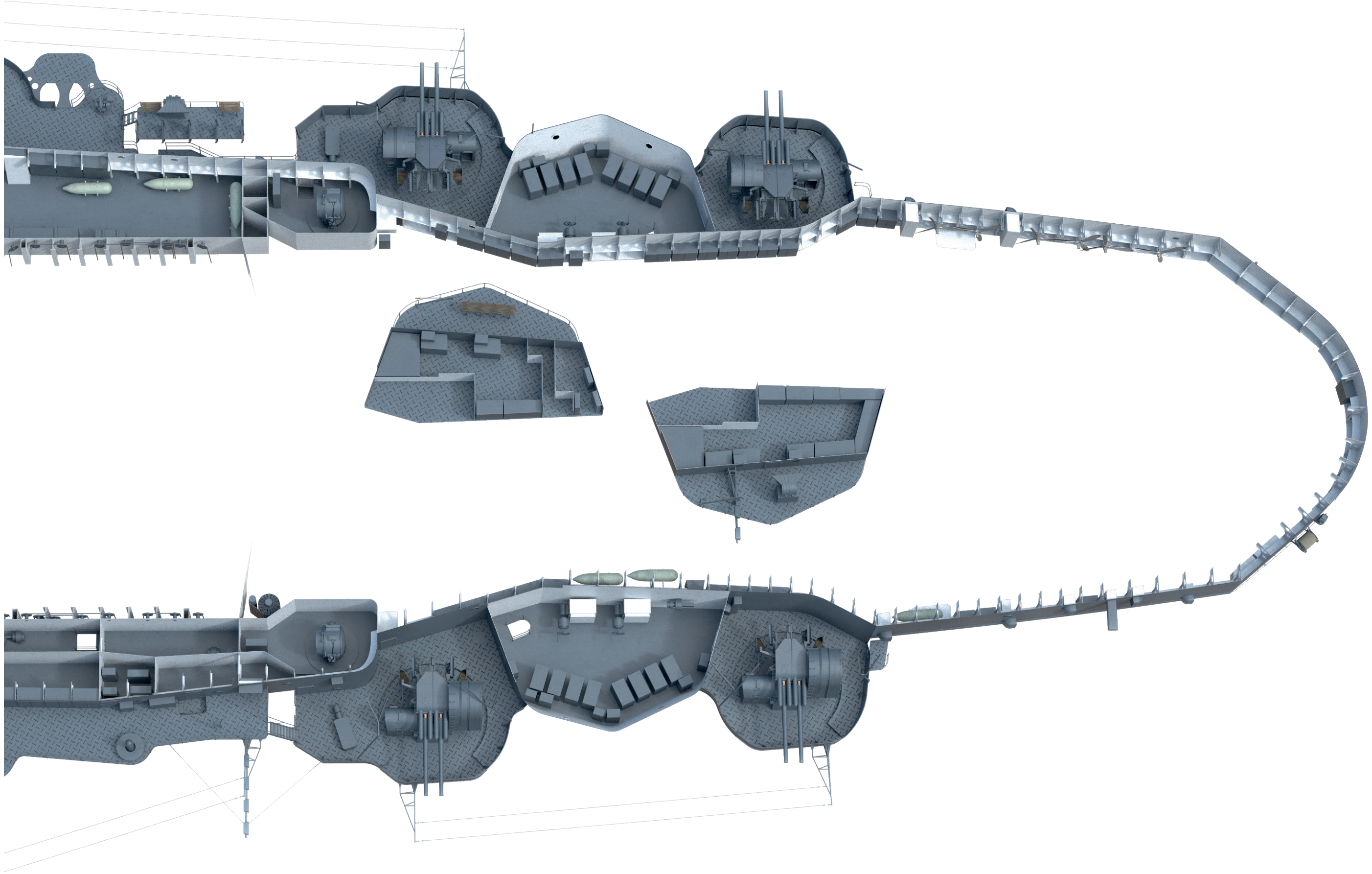


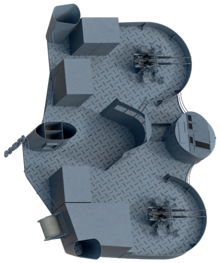












DECK PLANS (1/300 SCALE)

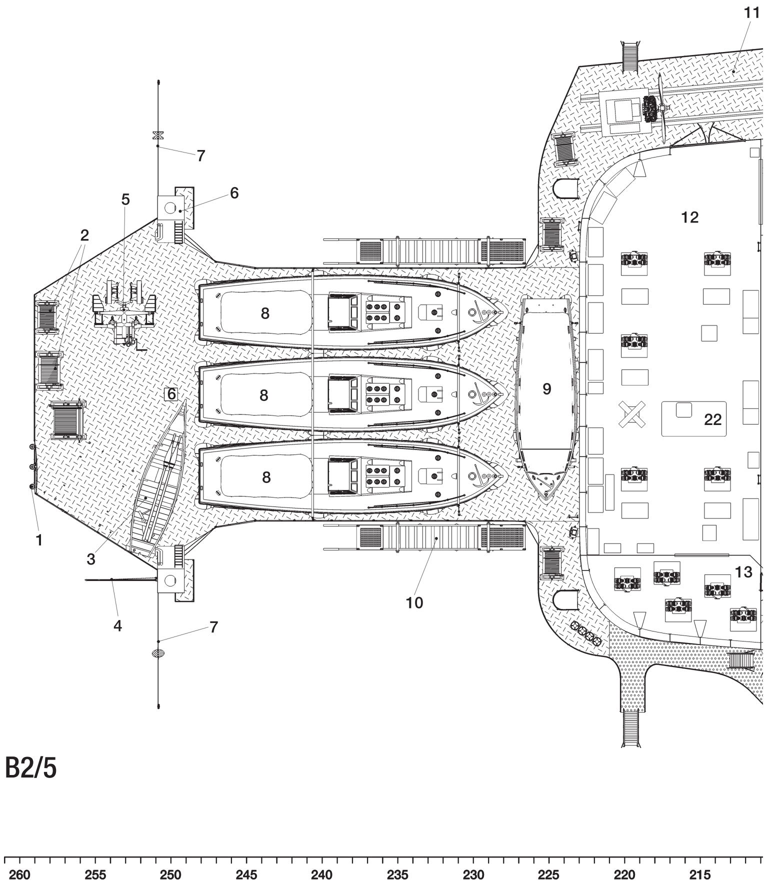
B2/5 TOP DECK, FRAMES 135–261

1 Speed signal light array
2 Rope reel
3 6m row sampan
4 Derrick for the lowering of the sampan
5 High-angle gun practice loading machine (most probably removed shortly before the war)
6 Flight deck supports
7 Rudder signalling mark
8 12m motor boat
9 8m motor launch
10 Stowed accommodation ladder
11 Aircraft engine testing platform
12 Aircraft engine maintenance room
13 Aircraft engine storage room
14 Maintenance division storage room
15 Searchlight elevator motor room
16 Crane lower motor room
17 Dynamo adjustment room
18 Spare aircraft parts storage room
19 Radio direction finder room
20 Navigation division storage room
21 Weapons adjustment room
22 Engine transport hatch
23 Middle elevator trunk
24 Aft elevator trunk
25 Upper aircraft hangar (aft section)
26 Storage room
27 Fire protection bulkhead
28 Fire protection bulkhead guide
29 12.7cm ammunition hoist
30 25mm ammunition hoist
31 Wire antenna mast support
32 Machine gun platform support
33 Lowered platform for entering shielded 25mm gun mount from the underside
34 Top of outer vent trunk
35 12.7cm gun mount support

B2/6 UNDERSIDE OF THE STERN BOAT PLATFORM

B2/7 RIGGED AWNING STANCHIONS ON THE BOAT PLATFORM – PLAN (FRAGMENT)

B2/8 RIGGED AWNING STANCHIONS ON THE BOAT PLATFORM – RIGHT PROFILE (FRAGMENT)



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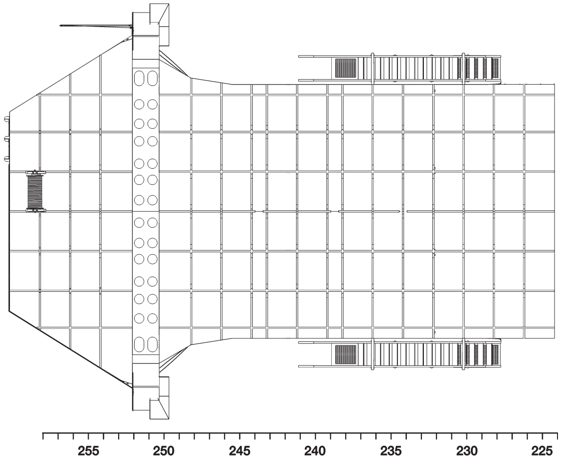

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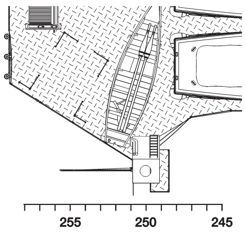

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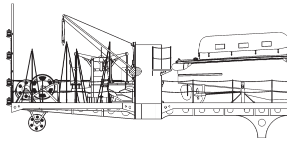

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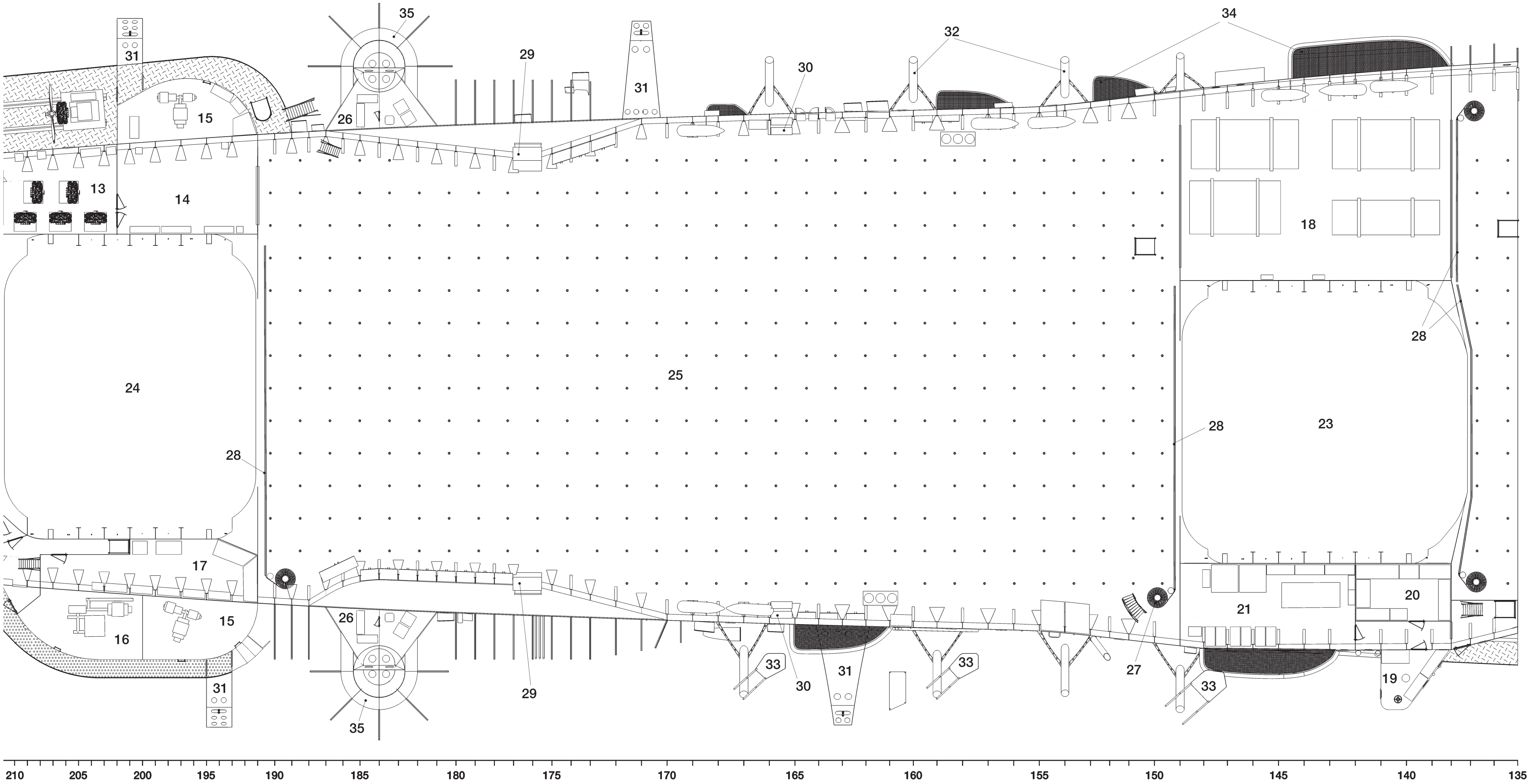
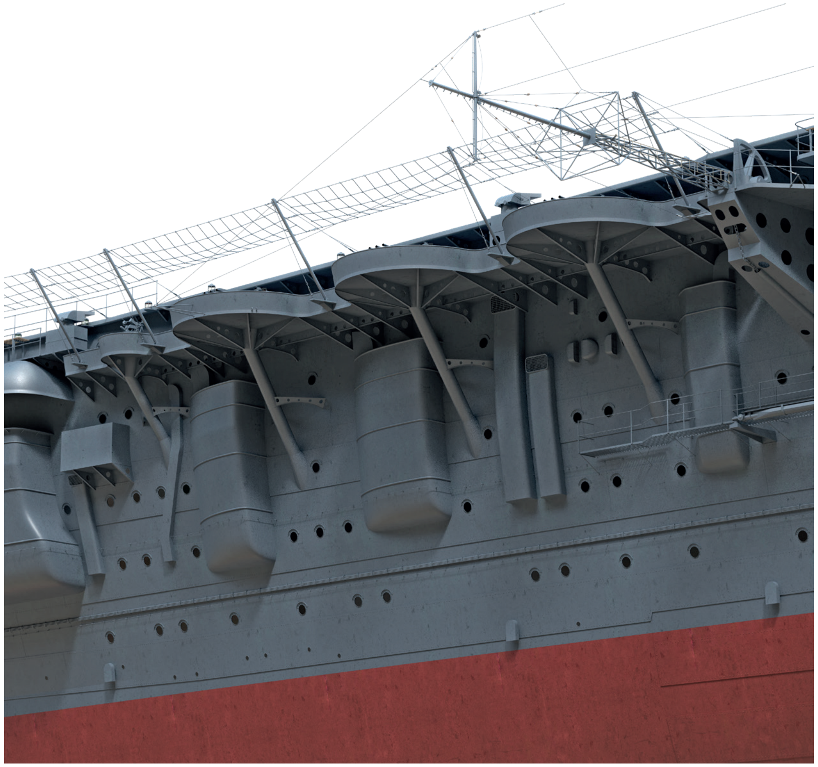
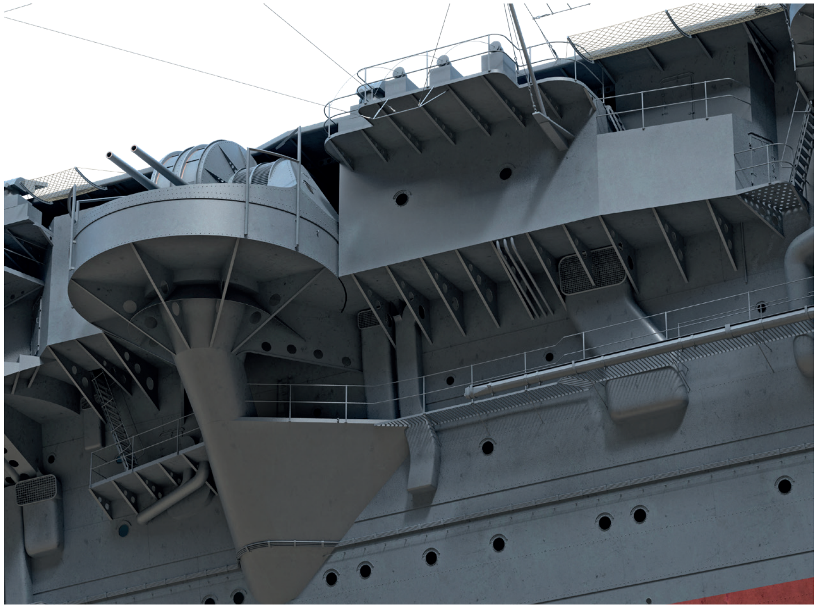
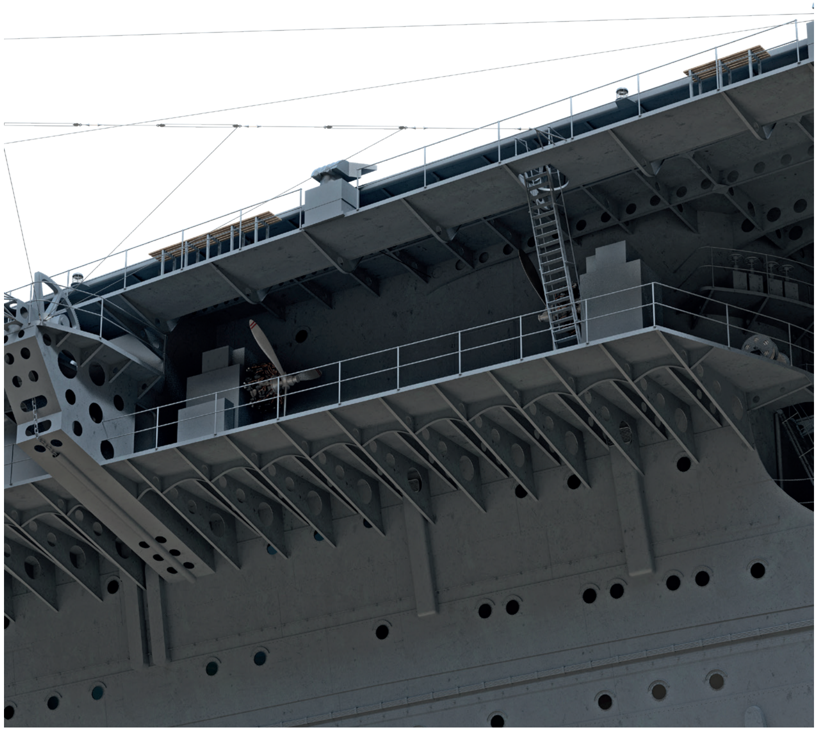
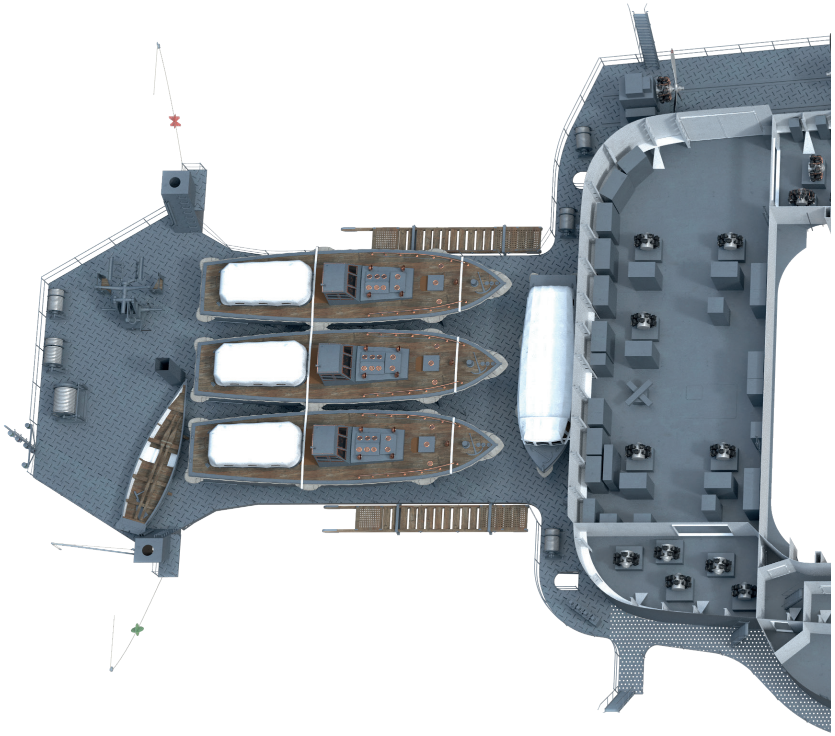
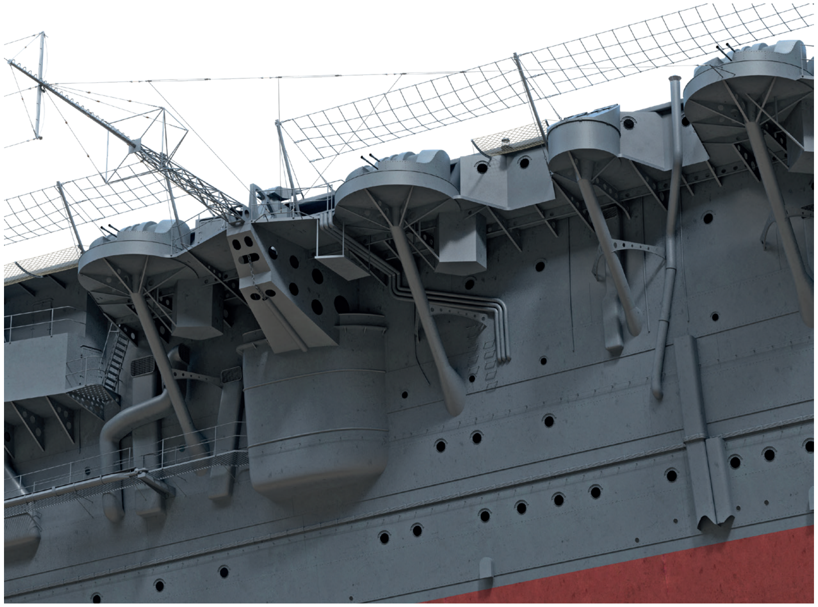


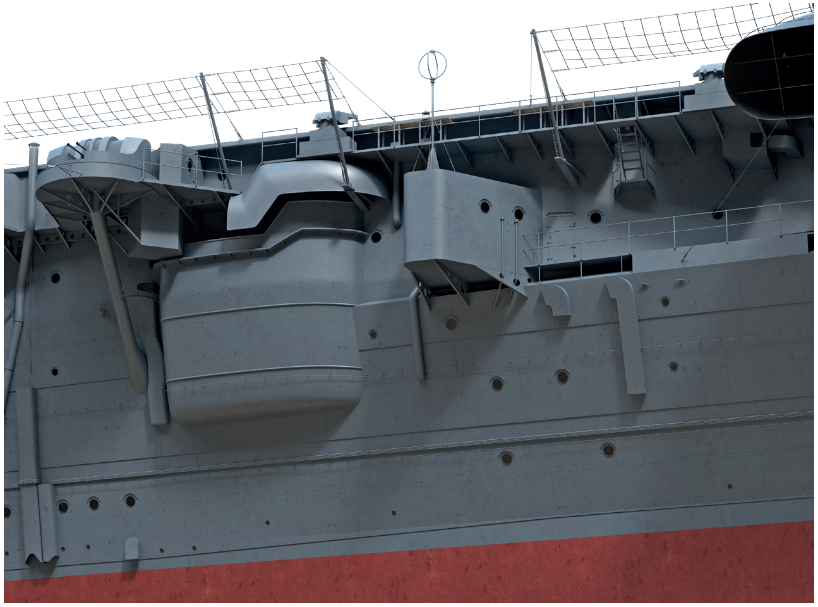


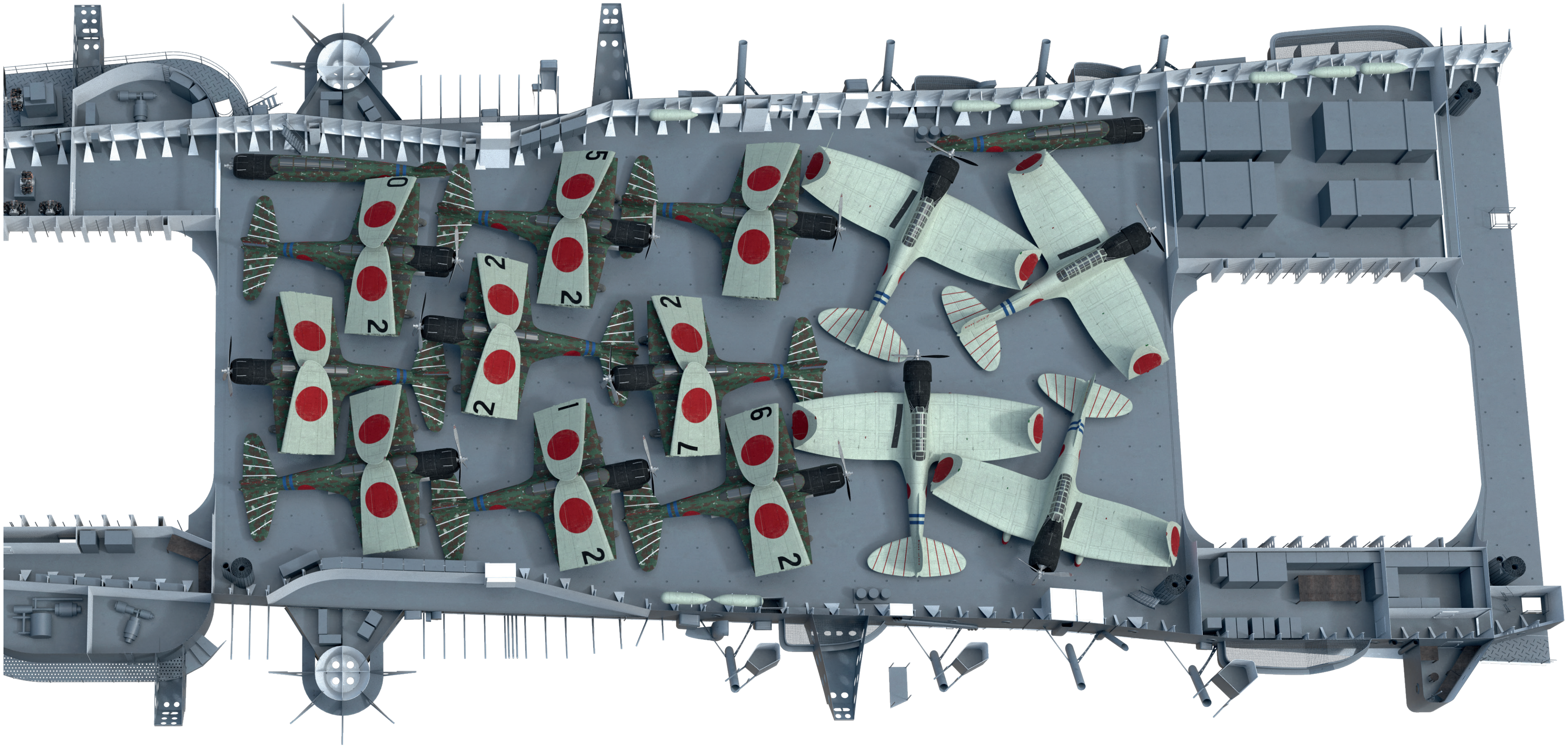












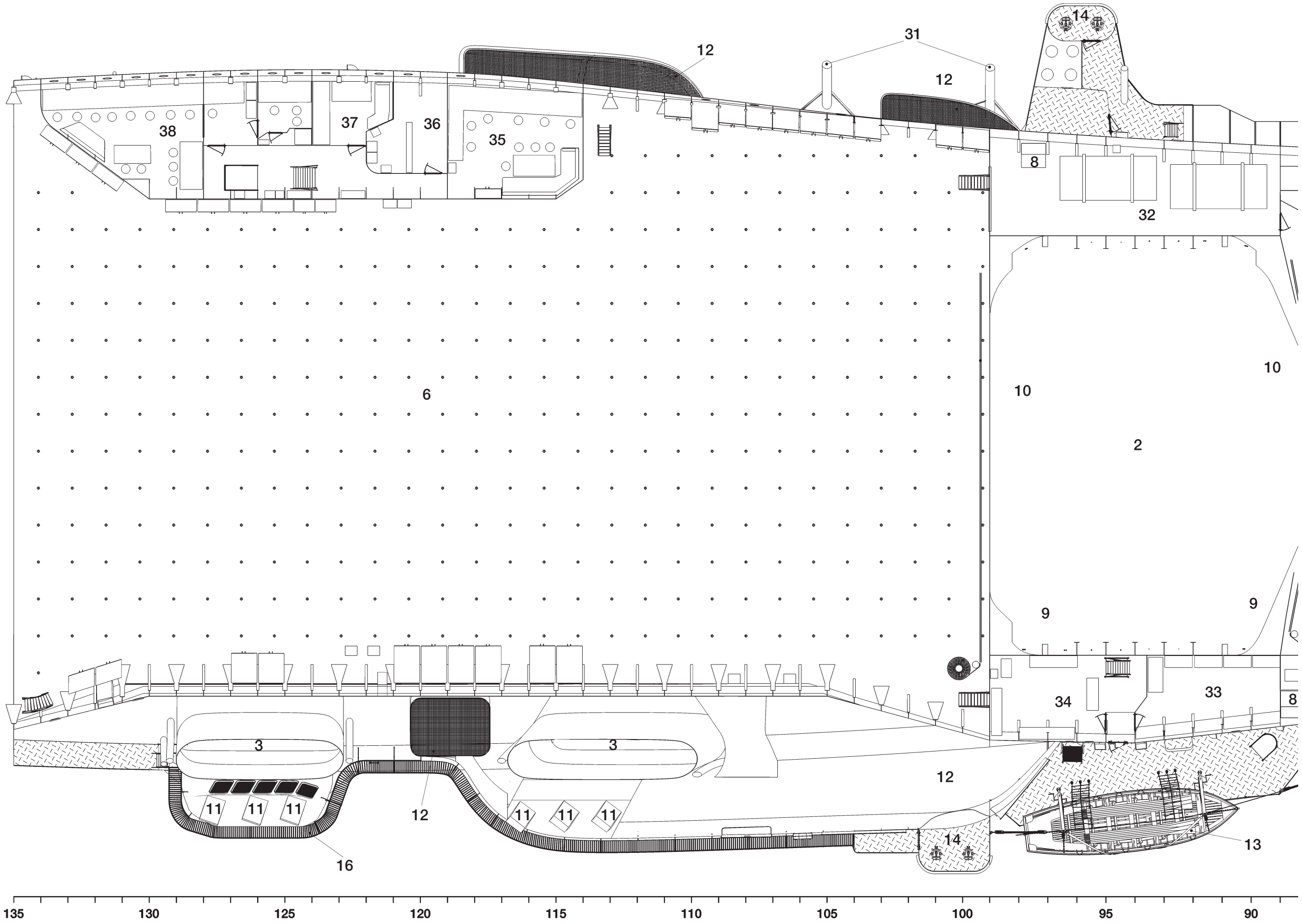
DECK PLANS (1/300 SCALE)

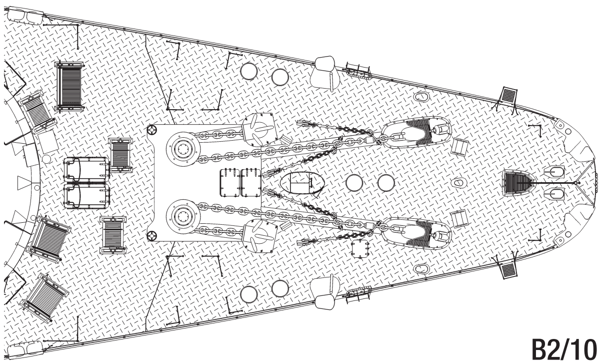
B2/9 TOP DECK, FRAMES 0–135

1 12.7cm gun mount support
2 Fore elevator trunk
3 Funnel uptake
4 Lower aircraft hangar (fore section)
5 Lower aircraft hangar (middle section)
6 Fire protection bulkhead
7 12.7cm ammunition hoist
8 25mm ammunition hoist
9 Fire protection bulkhead
10 Fire protection bulkhead guide
11 Funnel support
12 Boiler room vent duct
13 9m cutter in davits
14 Low angle lookout post
15 Searchlight elevator motor room
16 Side catwalk
17 Reel
18 Side fairlead
19 Bow fairlead
20 Hatch
21 Anchor capstan
22 Flight deck supports
23 Bollards
24 Paravane fairlead
25 Leadman's platform (stowed position)
26 Jack staff
27 Scupper
28 Anchor hawse
29 Mooring pipe
30 12.7cm ammunition handling room support
31 25mm gun sponson support
32 Spare aircraft parts storage room
33 Laboratory
34 Flight division storage room
35 Maintenance division office
36 Switchboard room
37 Communication staff waiting room
38 Radio room
39 Maintenance division storage room
40 Artillery division storage room
41 Gunpowder storage room

B2/10 RIGGED AWNING STANCHIONS AND LEADMAN'S PLATFORMS ON THE FORECASTLE – PLAN (FRAGMENT)

B2/11 RIGGED AWNING STANCHIONS AND LEADMAN'S PLATFORMS ON THE FORECASTLE – RIGHT PROFILE (FRAGMENT)





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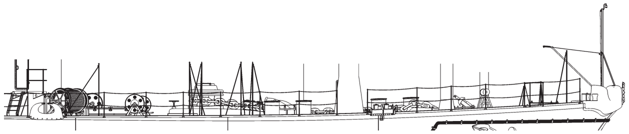

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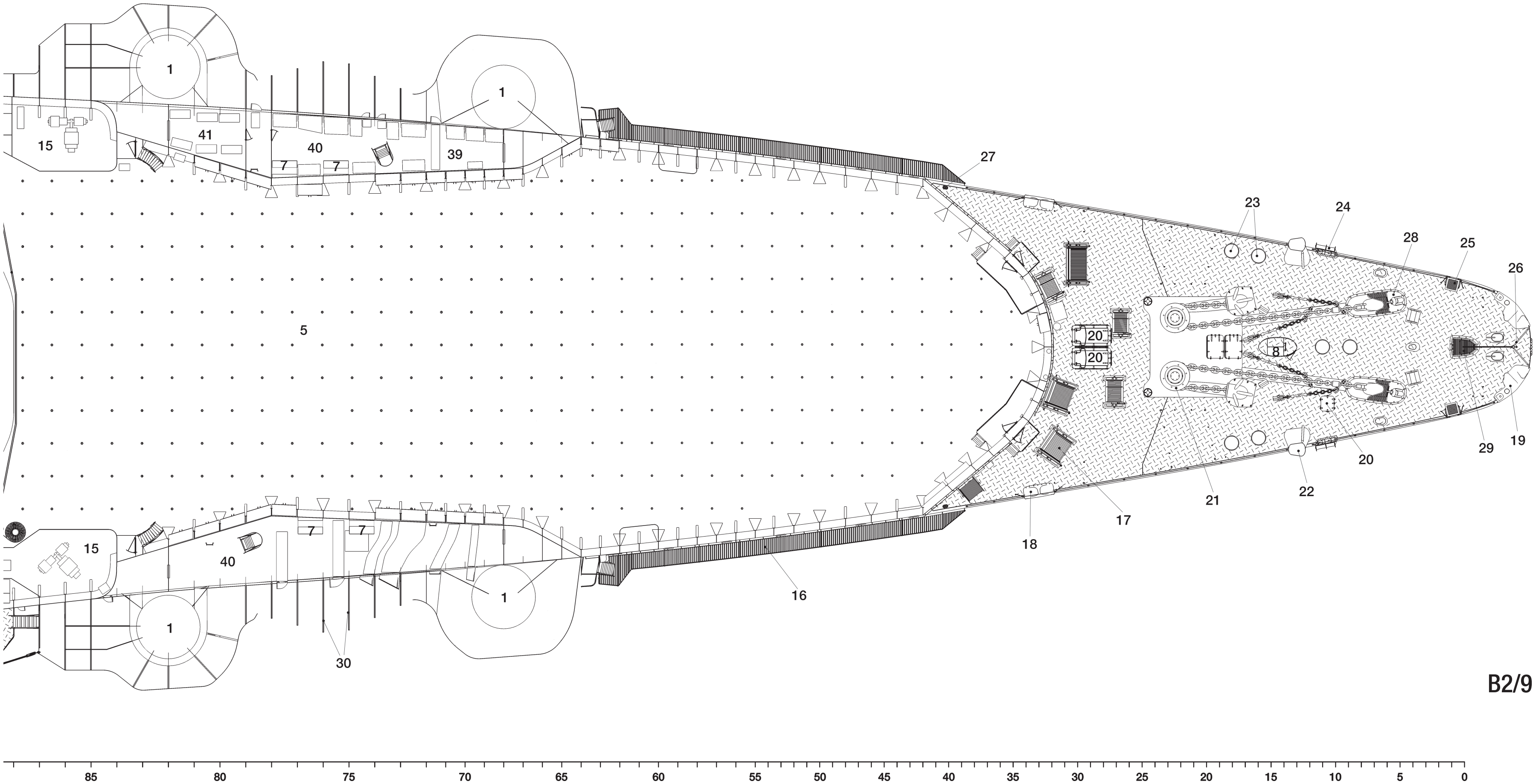
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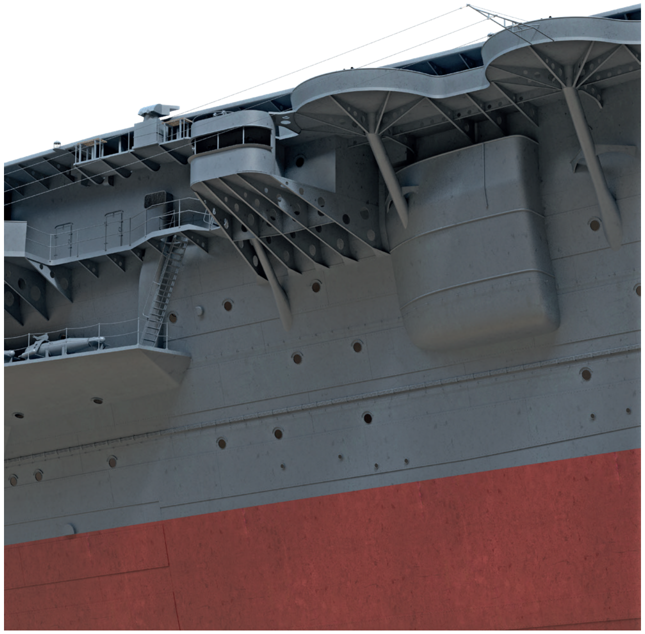

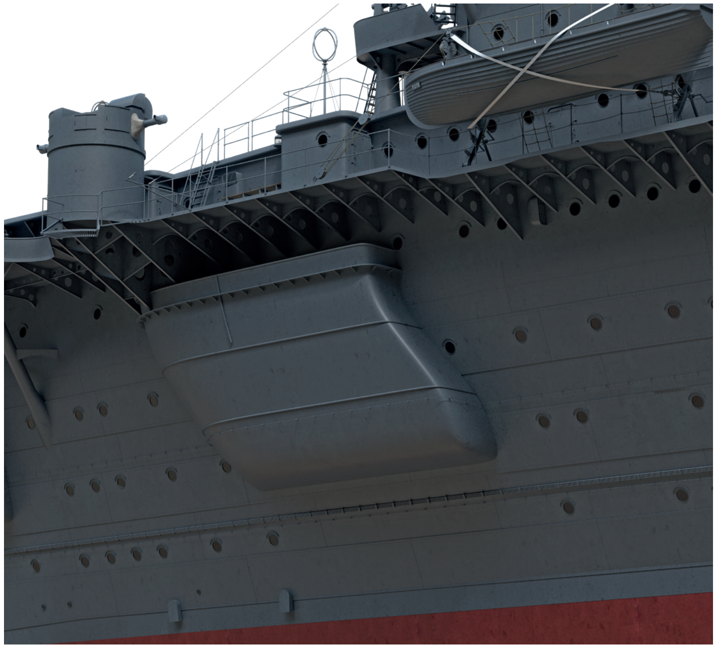

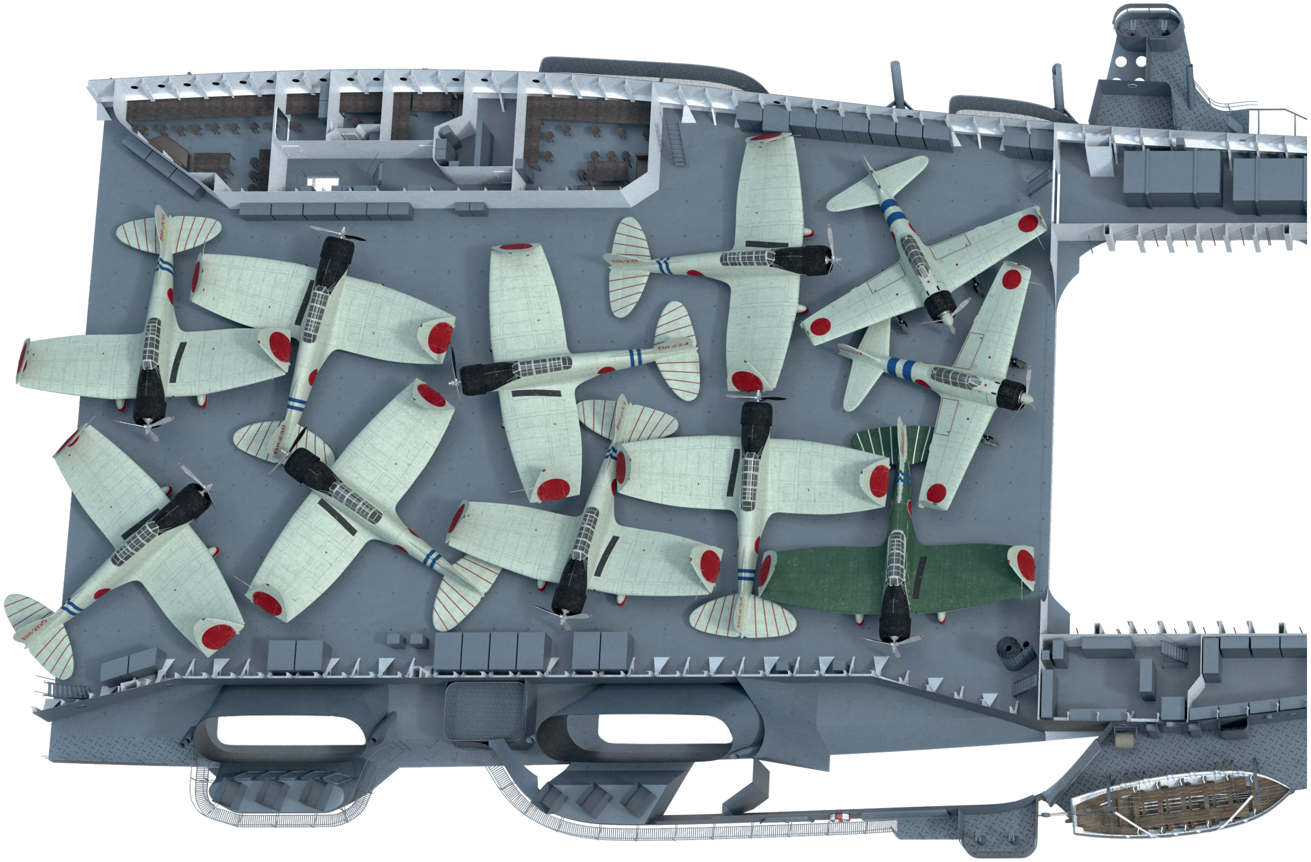

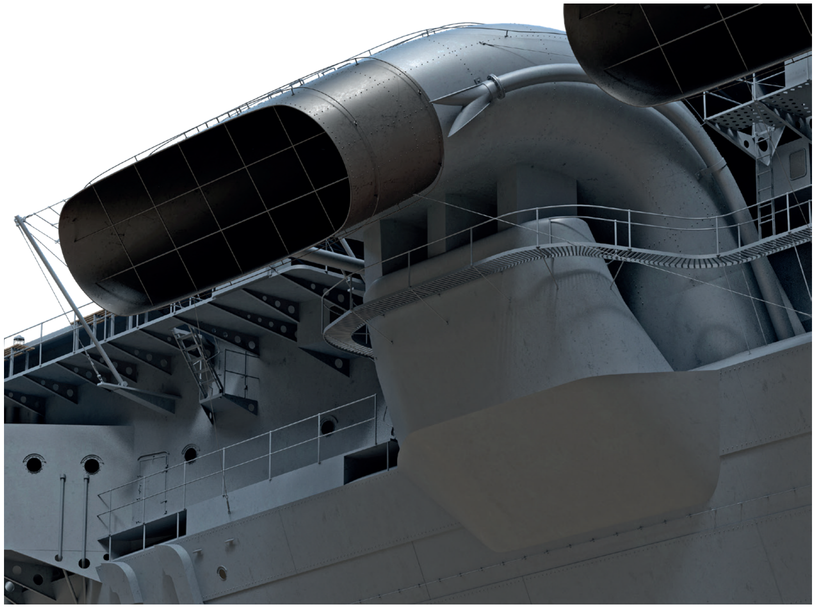

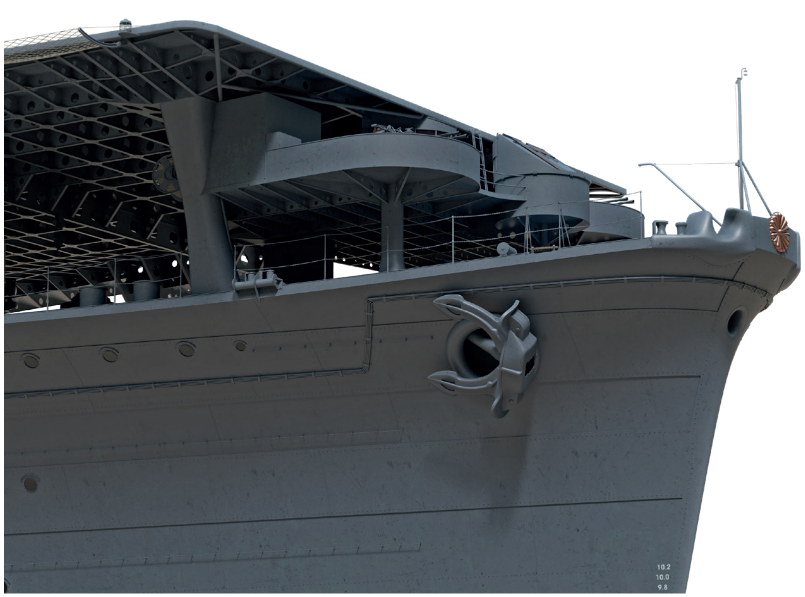
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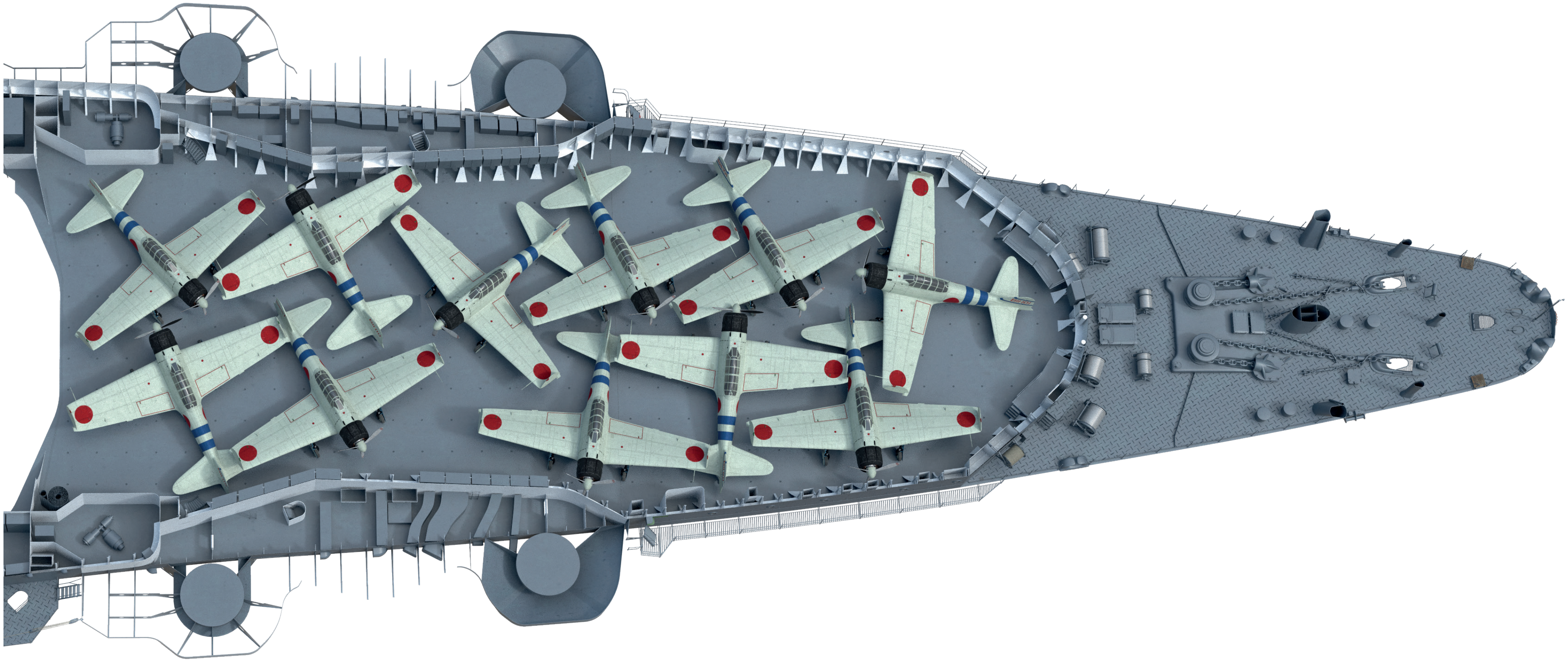
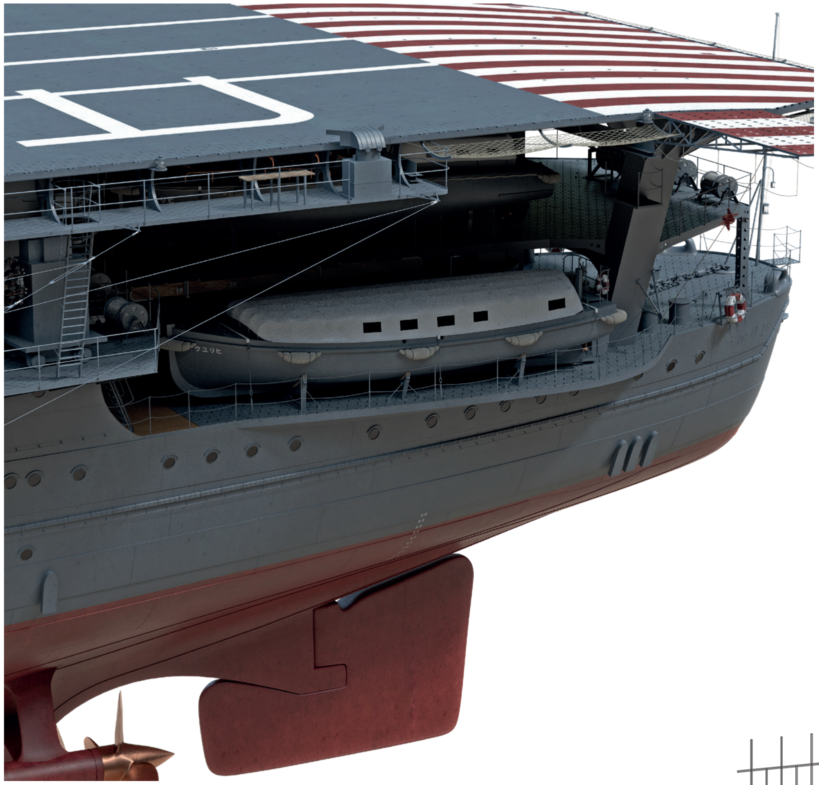
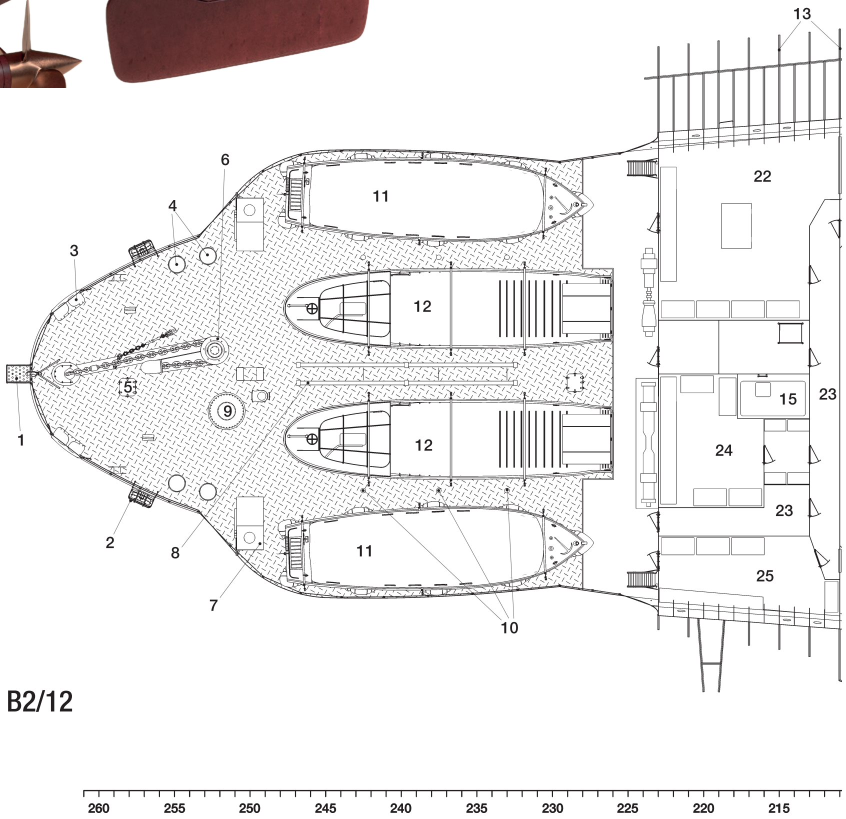


DECK PLANS (1/300 SCALE)

B2/12 UPPER DECK, FRAMES 135–261

1 Stern platform
2 Life buoy
3 Fairlead
4 Bollards
5 Deck hatch
6 Stern anchor capstan
7 Flight deck supports
8 Fuelling hose
9 Towing bitt
10 Boat platform support (removed when inner boats were moved outboards)
11 12m motor launch
12 13m special type transportation boat
13 Engine testing platform support
14 12.7cm gun mount support
15 Engine transport hatch
16 Middle elevator trunk
17 Aft elevator trunk
18 Lower aircraft hangar (aft section)
19 Fire protection bulkhead
20 12.7cm ammunition hoist
21 25mm ammunition hoist
22 Woodworking shop
23 Passage
24 Washing machine room
25 Disinfection room
26 Aft radio room
27 Aft radio equipment room
28 Drafting room and storage room
29 Officers' bedroom
30 Flight crew's quarters
31 Flight crew's dining room
32 Storage room
33 Fire protection bulkhead motor room
34 Battery storage room
35 Boat boom (stowed)





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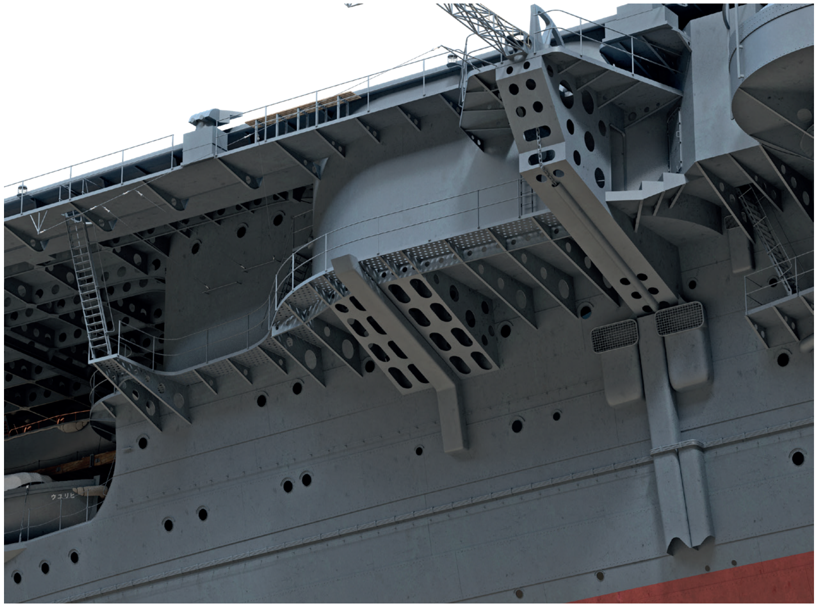

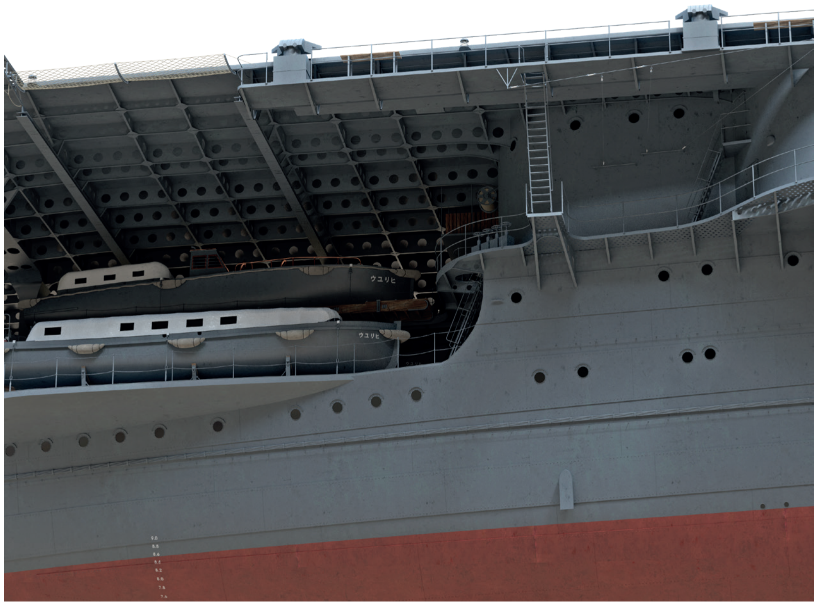

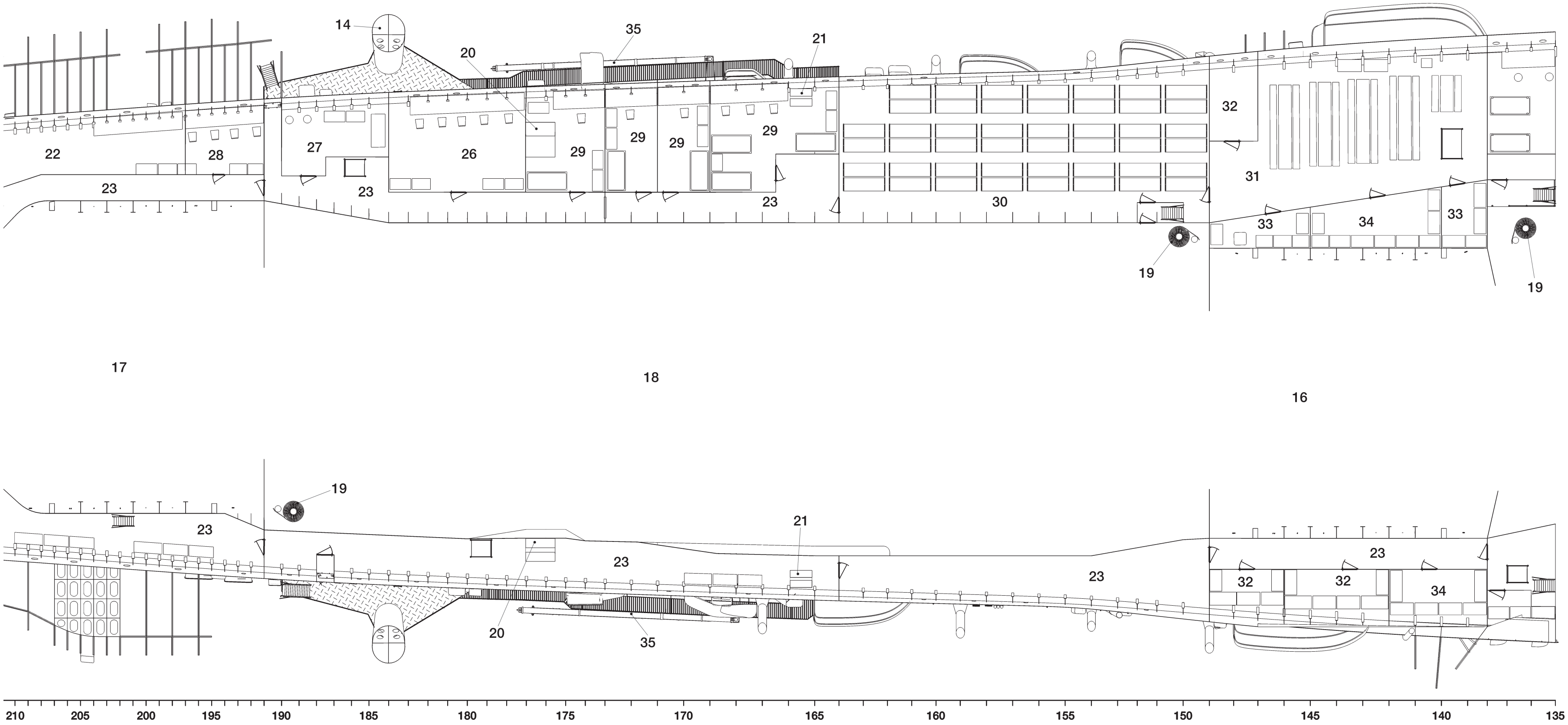
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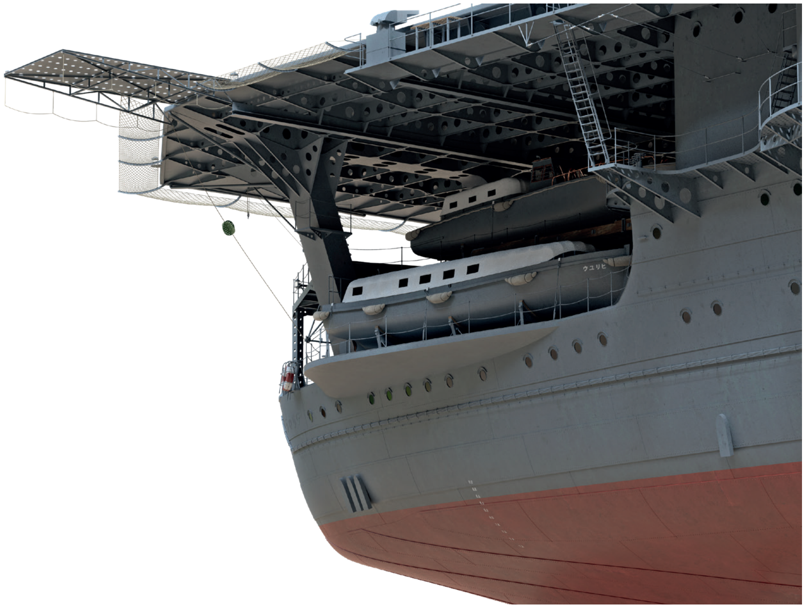
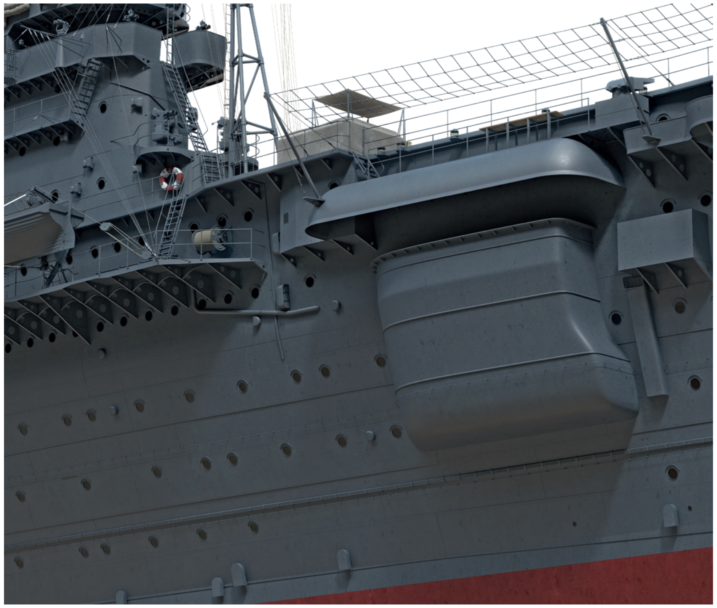
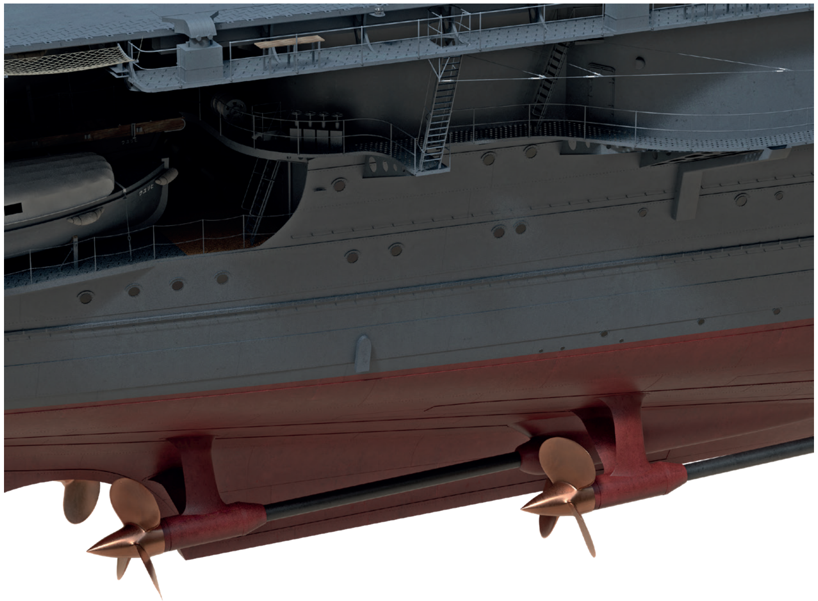
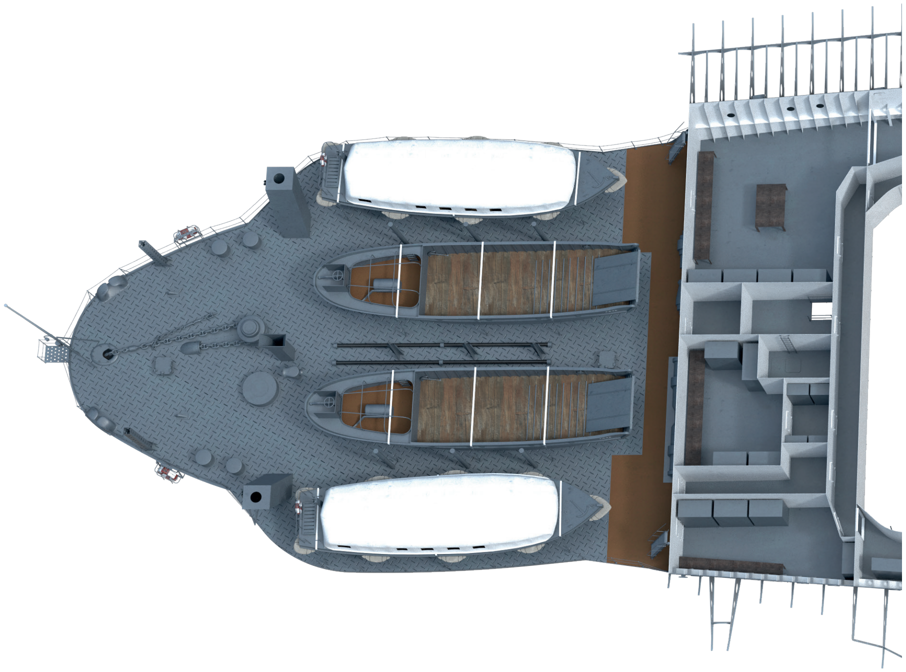
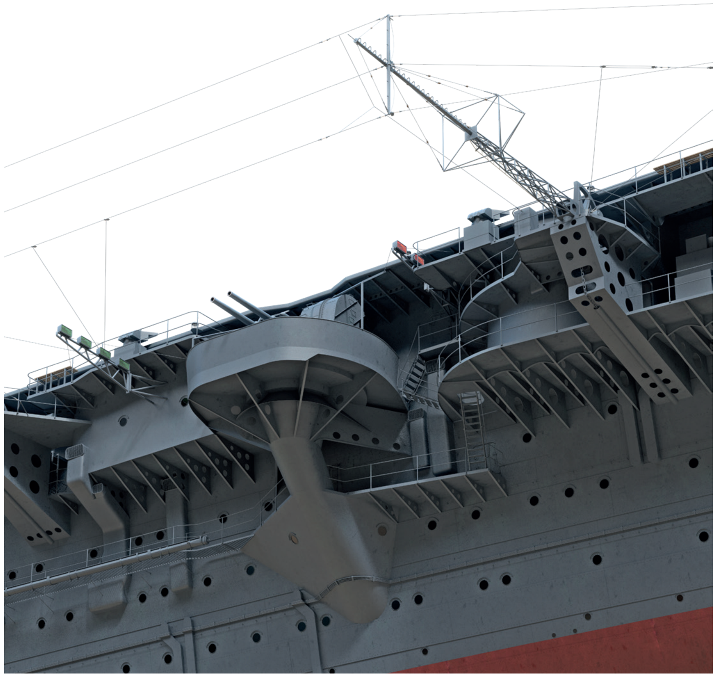
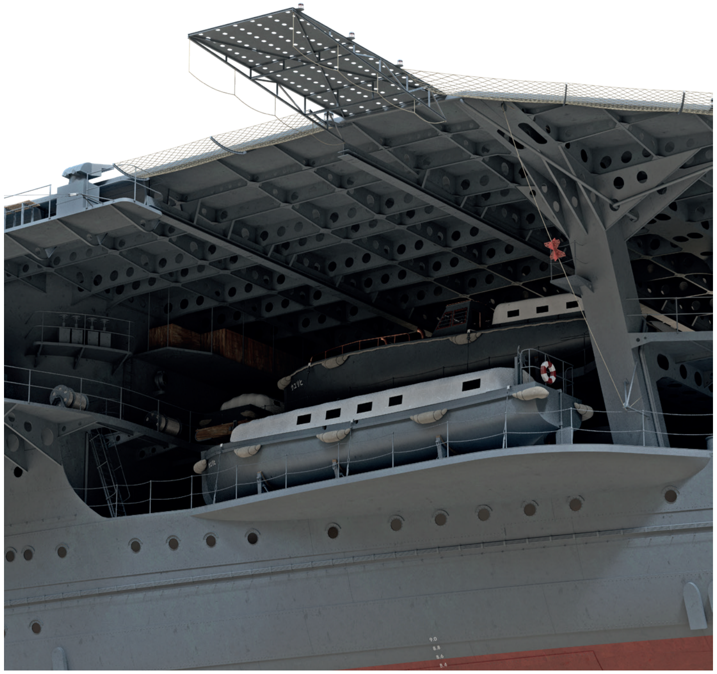


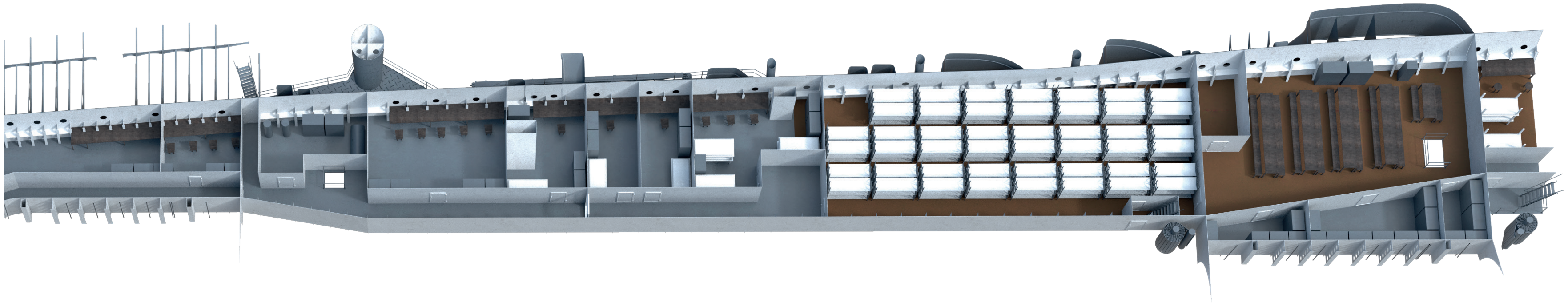


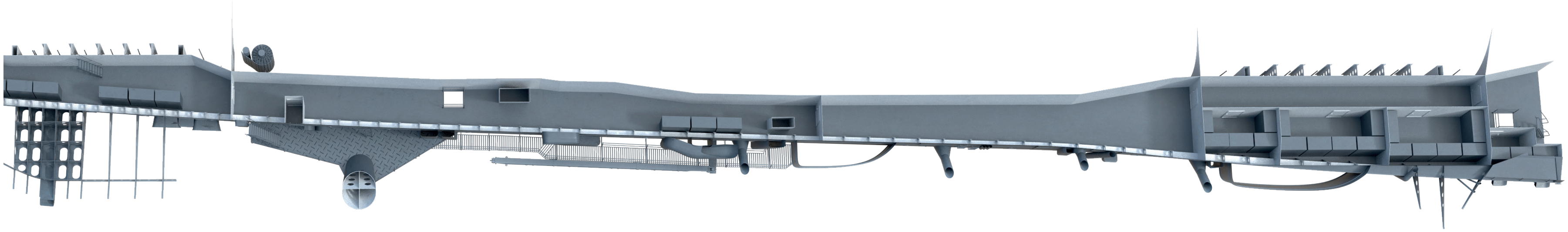








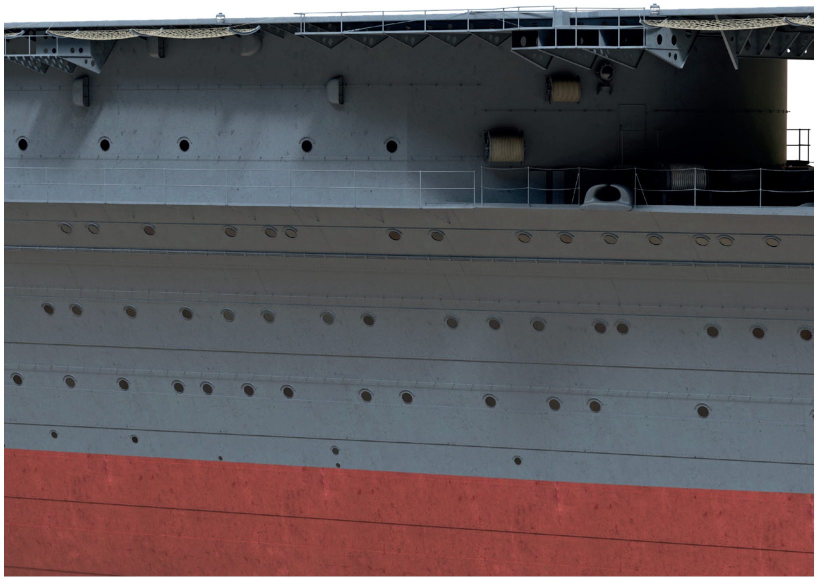


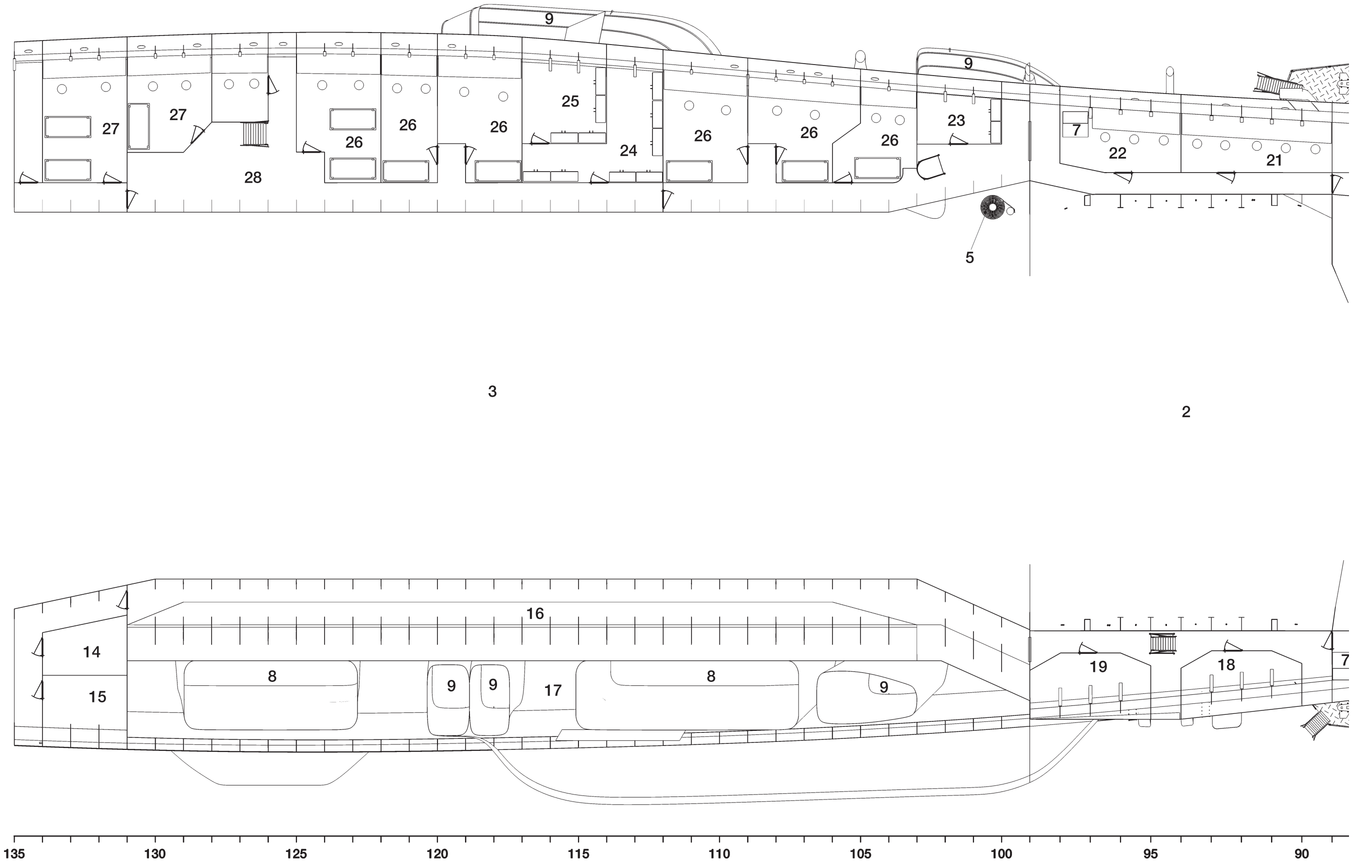


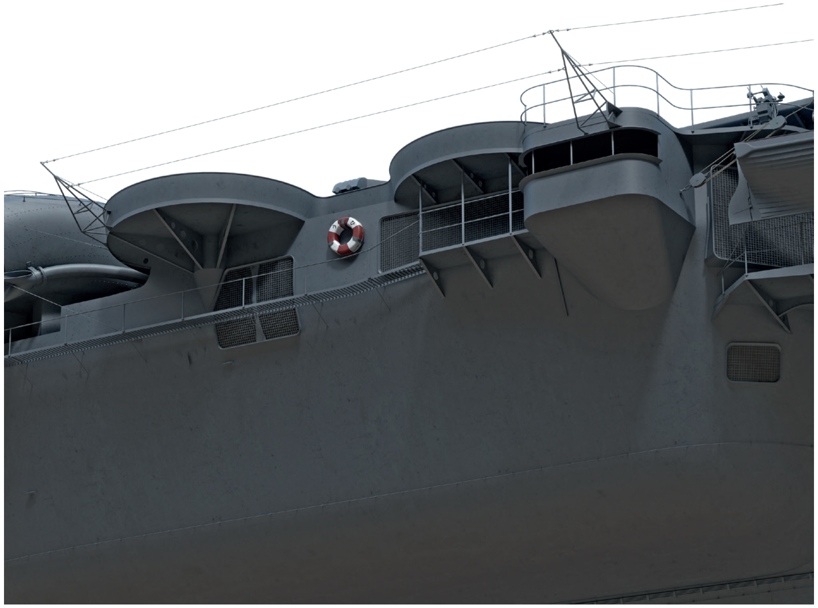
DECK PLANS (1/300 SCALE)

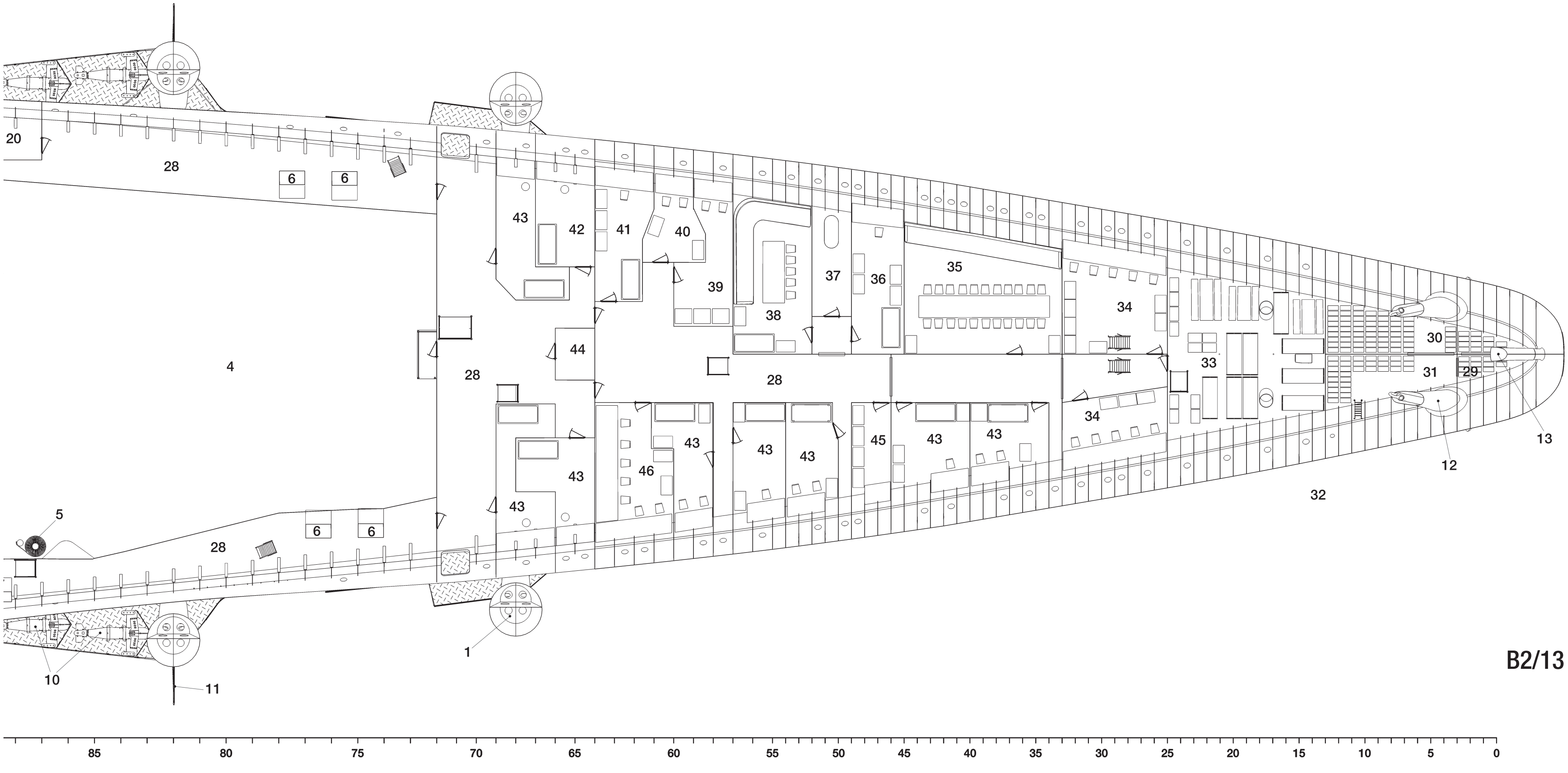
B2/13 UPPER DECK, FRAMES 0–135

1 12.7cm gun mount support
2 Fore elevator trunk
3 Lower aircraft hangar (middle section)
4 Lower aircraft hangar (fore section)
5 Fire protection bulkhead
6 12.7cm ammunition hoist
7 25mm ammunition hoist
8 Funnel uptake
9 Boiler room vent trunk
10 Stowed paravane
11 Paravane derrick
12 Main anchor hawse
13 Mooring pipe
14 Optical equipment storage room
15 Emergency equipment storage room
16 Machinery storage room
17 Laundry storage room
18 Navigation division storage room
19 Communication division storage room
20 Paravane equipment storage room
21 Emergency command centre
22 Air group commander's office
23 Storage room
24 Photography workshop
25 Dark room
26 Air group officer's cabin
27 Officer's cabin
28 Passage
29 Operations division storage room
30 Lubricating oil storage room
31 Paint storage room
32 Anchor chain pipe
33 Enlisted men's quarters
34 Command staff office
35 Commander's office
36 Commander's sleeping room
37 Commander's bathroom
38 Commander's day room
39 Operations office
40 Maintenance office
41 Air group commander's cabin
42 Chief engineer's cabin
43 Officer's cabin
44 Compass room
45 Tableware storage room
46 Accounting office





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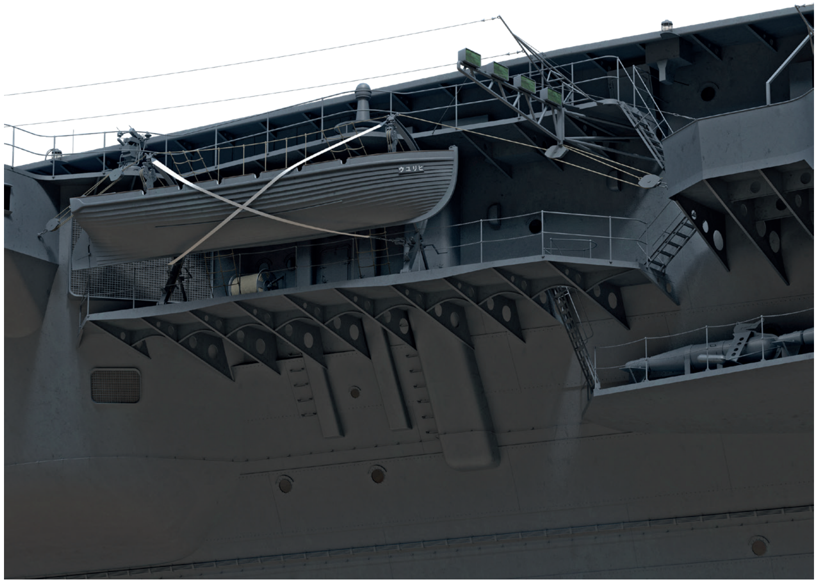
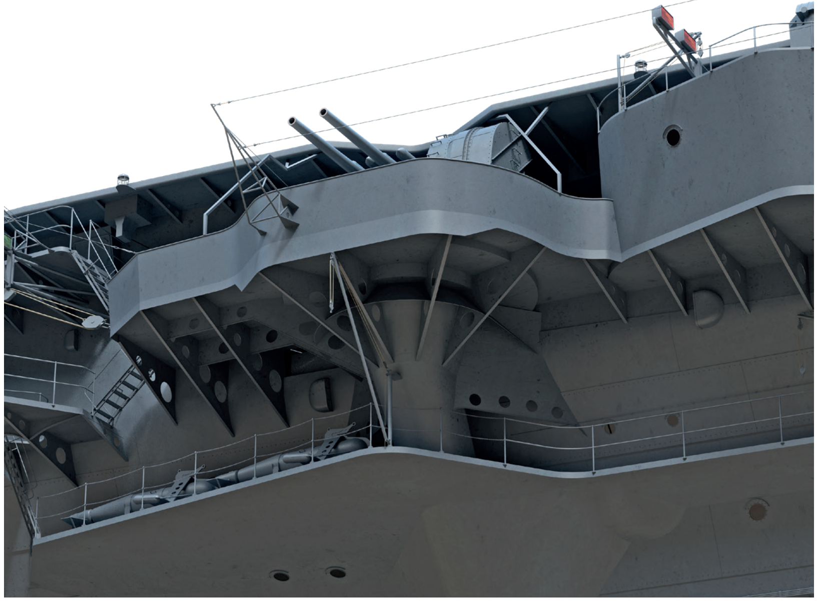
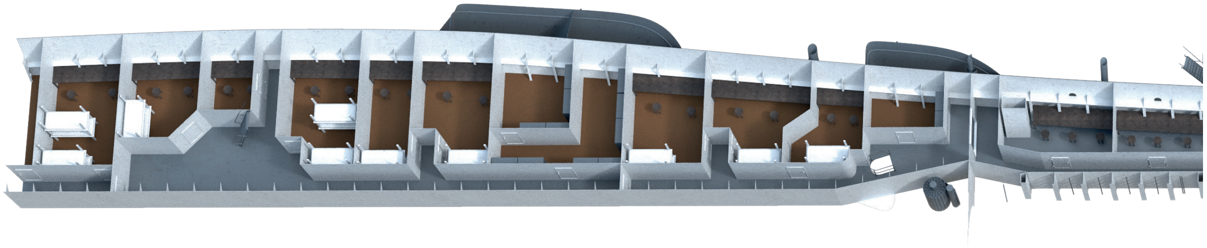
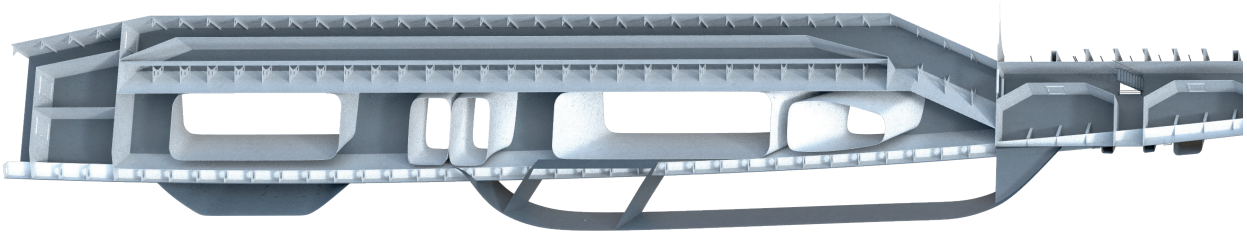
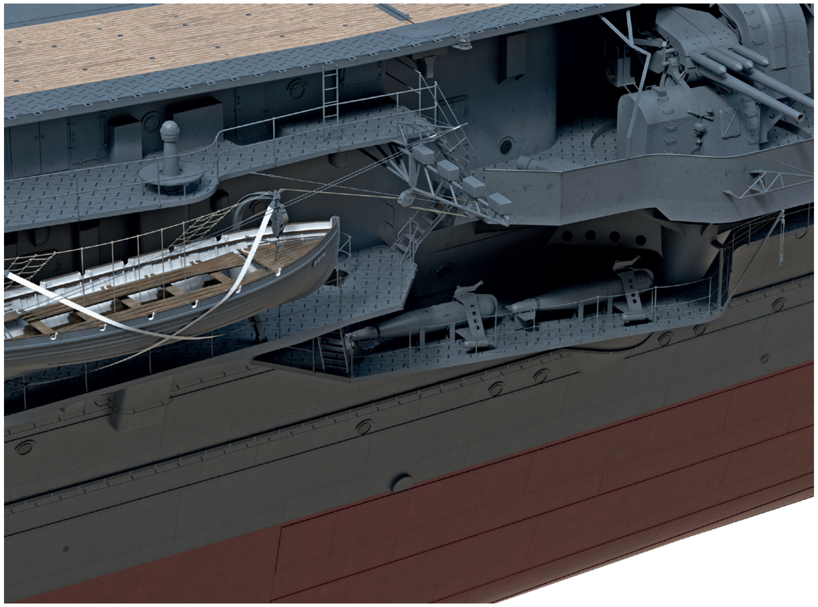
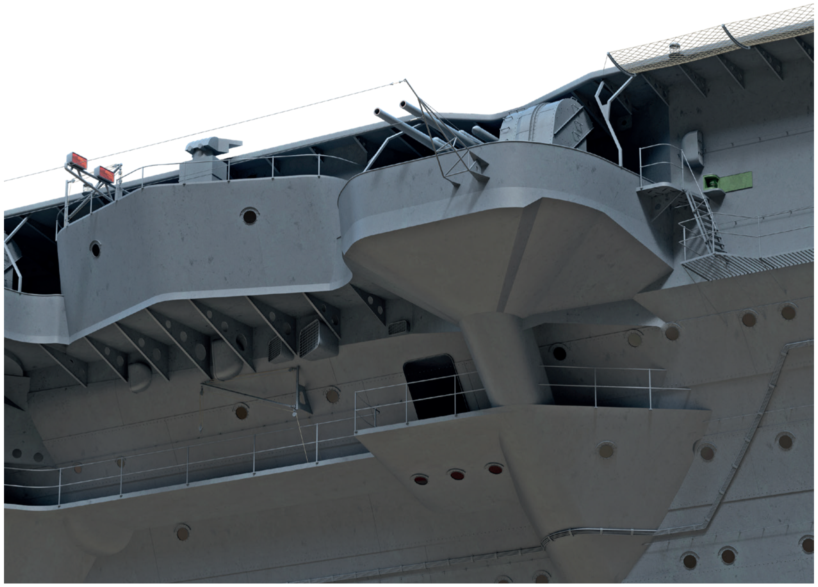


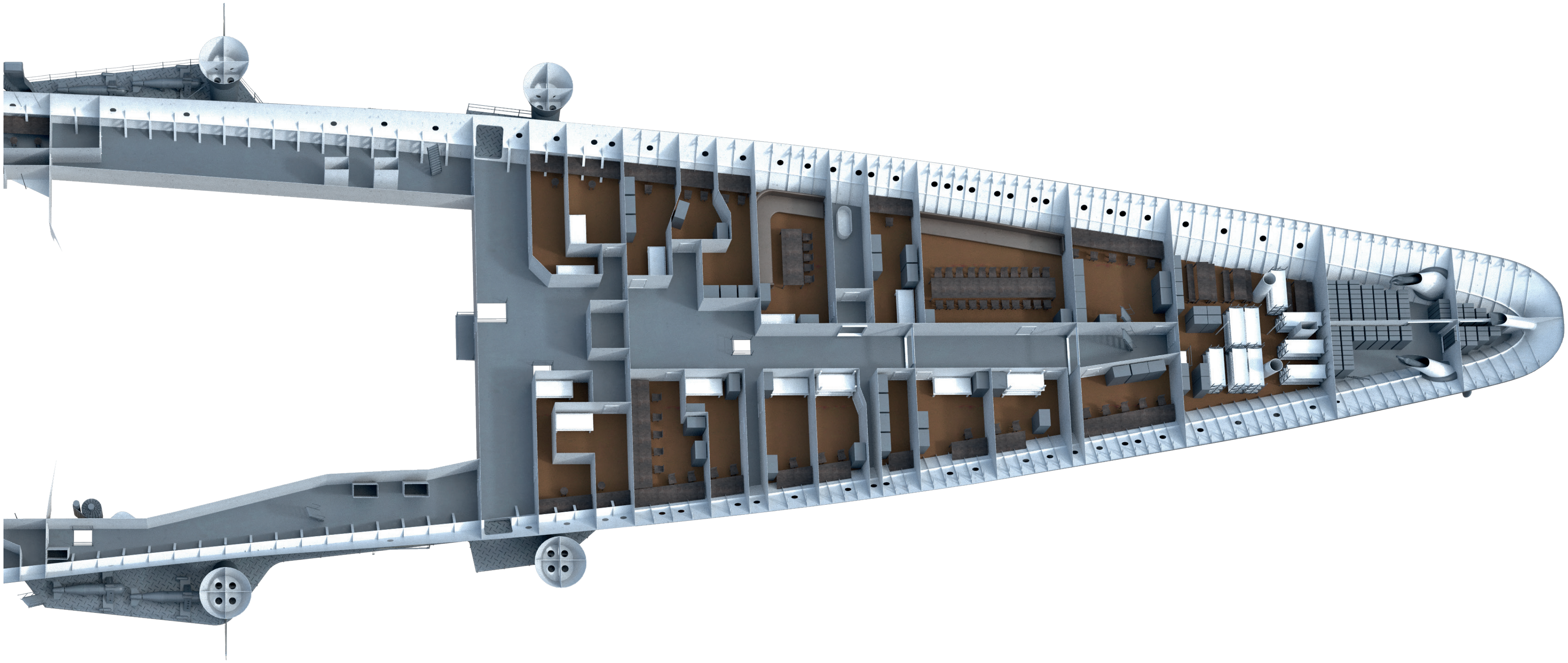








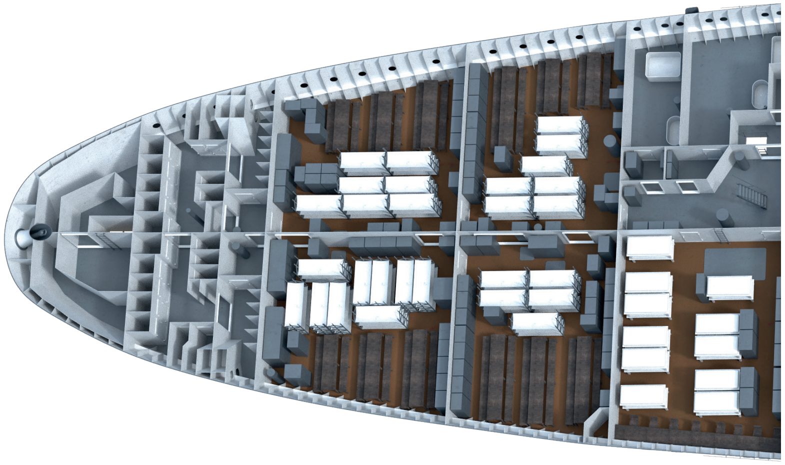


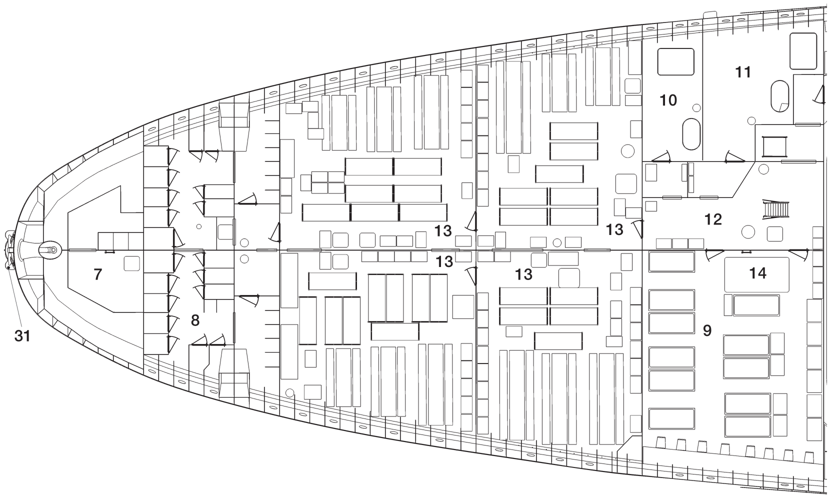


DECK PLANS (1/300 SCALE)

B2/14 MIDDLE DECK, FRAMES 135–261

1 Middle elevator trunk
2 Aft elevator trunk
3 Lower aircraft hangar (aft section)
4 Fire protection bulkhead
5 Fire protection bulkhead guide
6 12.7cm ammunition hoist
7 Storage room
8 Toilet
9 Warrant officer's sleeping room
10 Bathroom
11 Washroom
12 Passage
13 Enlisted men's sleeping room
14 Engine transport hatch
15 Officer's cabin
16 Artillery division storage room
17 Visit room
18 Sewing machine room
19 Internal medicine clinic
20 Sick bay
21 Isolation room
22 Sick bay bathroom
23 Medical treatment room
24 Medical examination room
25 Medical storage room
26 Food storage room
27 X-ray room
28 Officer's sick bay
29 Pharmacy
30 Engine room vent trunk
31 Aft anchor
32 25mm ammunition hoist
33 Bomb elevator





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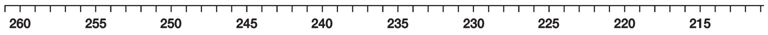

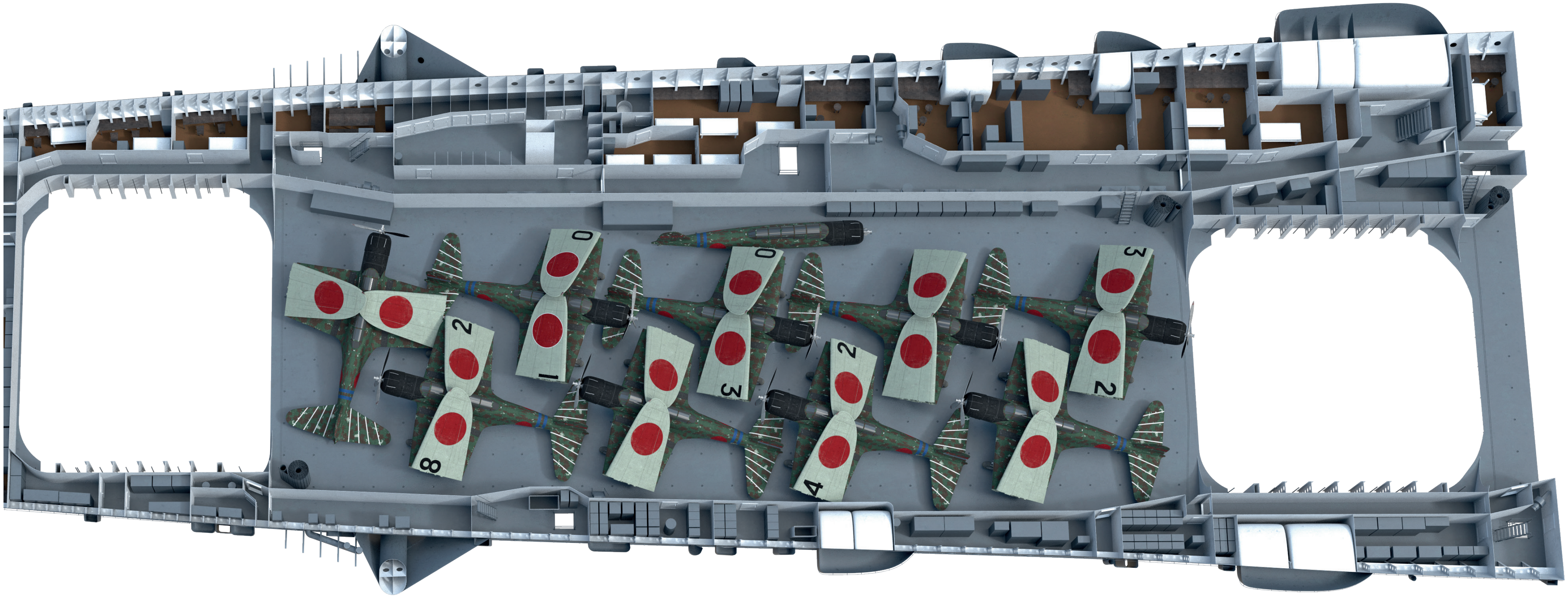

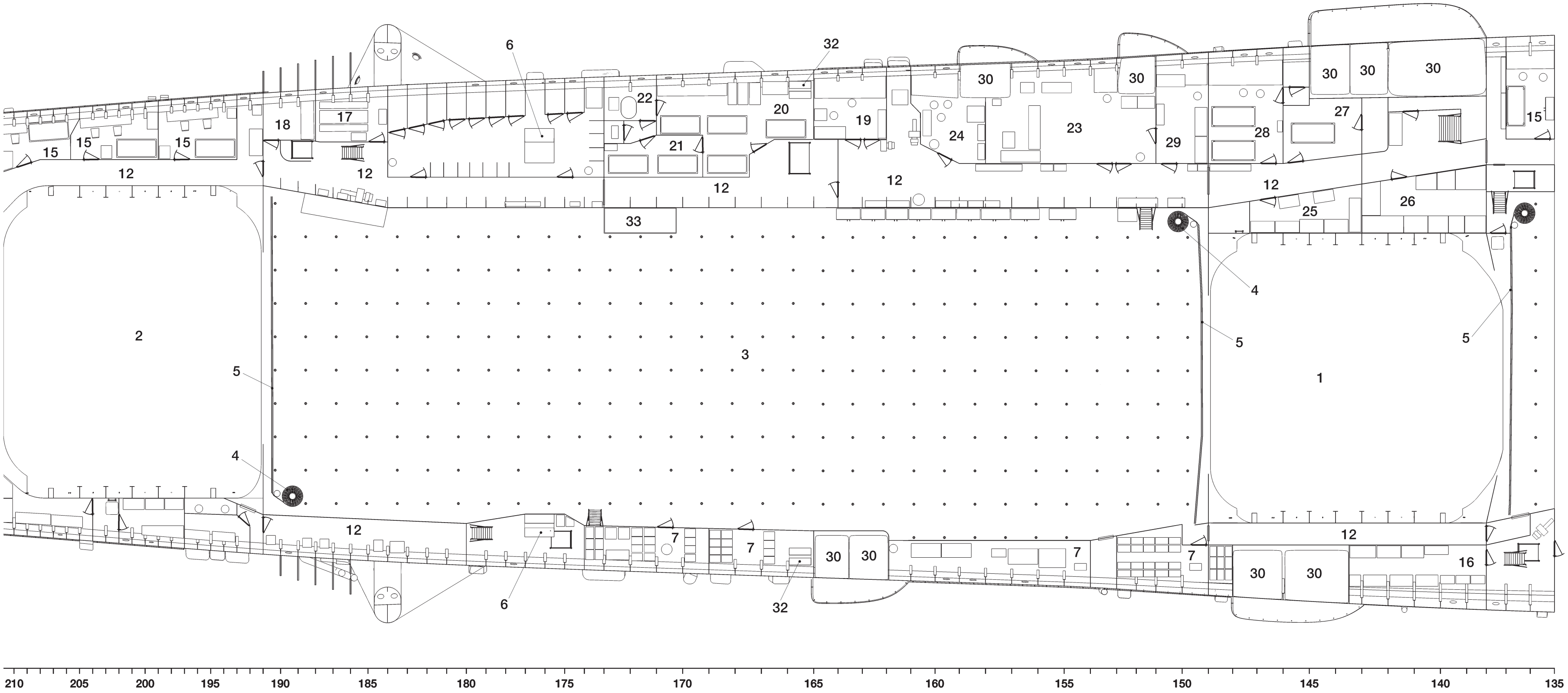
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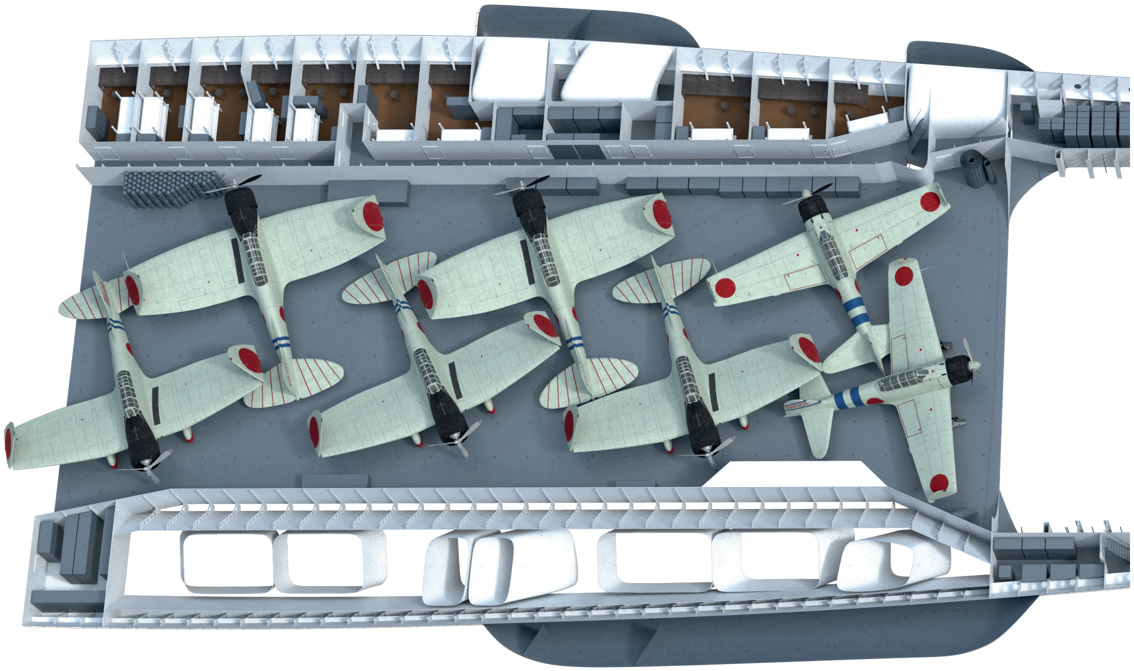
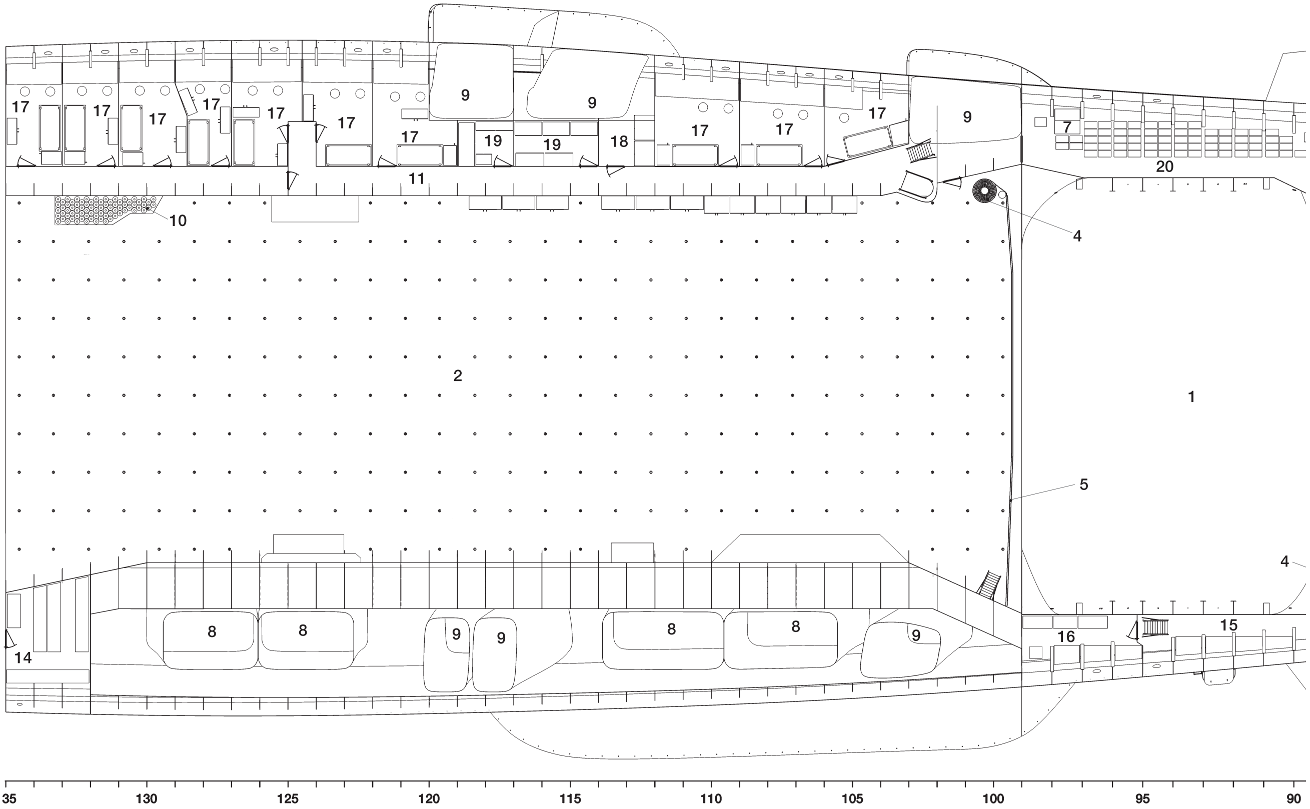
DECK PLANS (1/300 SCALE)

B2/15 MIDDLE DECK, FRAMES 0–135

1 Fore elevator trunk
2 Lower aircraft hangar (middle section)
3 Lower aircraft hangar (fore section)
4 Fire protection bulkhead
5 Fire protection bulkhead guide
6 12.7cm ammunition hoist
7 25mm ammunition hoist
8 Funnel uptake
9 Boiler room vent trunk
10 Carbon dioxide bottles
11 Passage
12 Anchor chain locker
13 Torpedo and bomb elevator
14 Maintenance division storage room
15 Engine division storage room
16 Mine division storage room
17 Officer's cabin
18 Accounting division storage room
19 Luggage storage room
20 Lubricating oil storage room
21 Maintenance division gasoline storage room
22 Enlisted men's quarters
23 Officer's mess
24 Tableware storage room
25 Artillery officer's cabin
26 Doctor's cabin
27 Toilet
28 Office
29 Dressing room
30 Officer's bathroom

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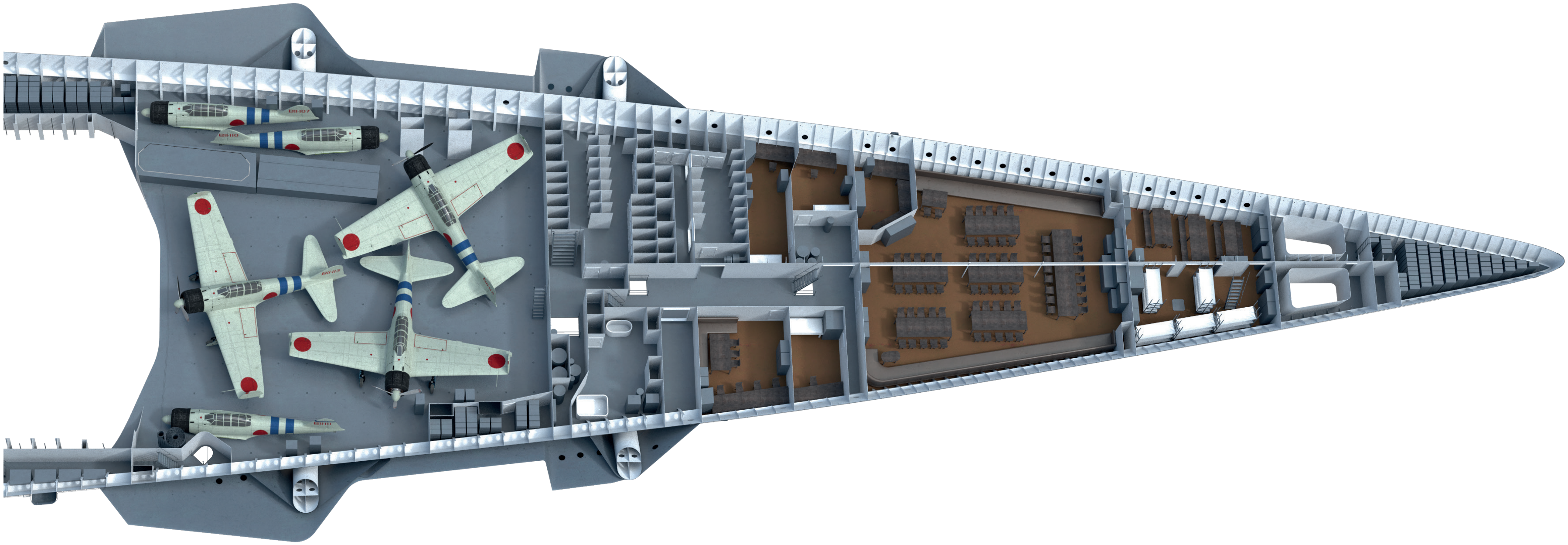

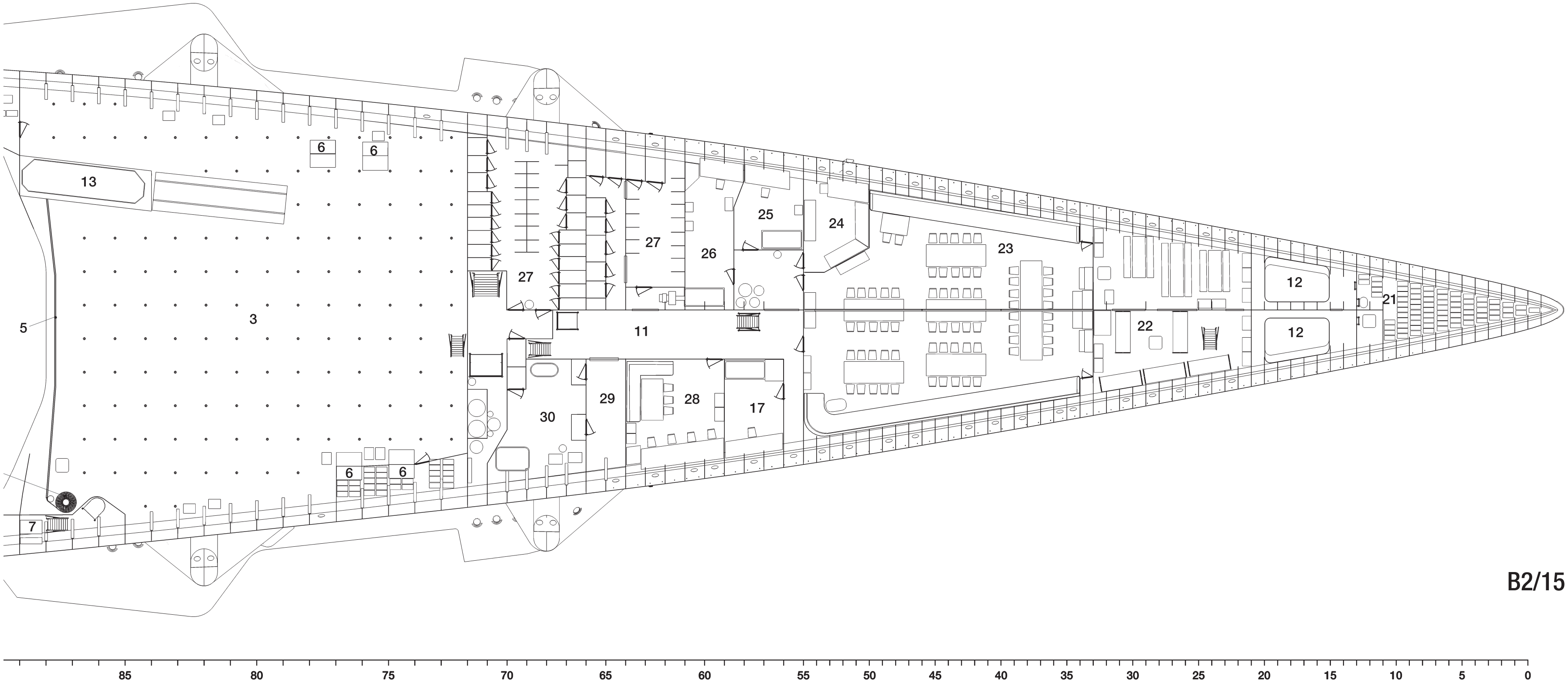
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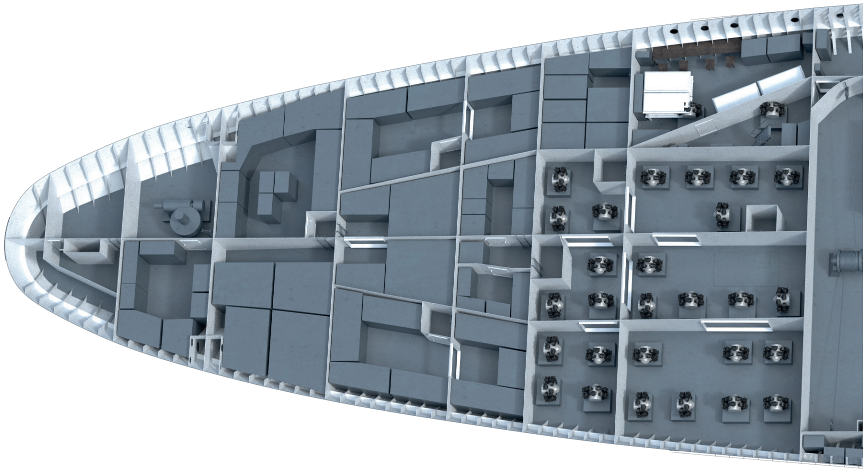
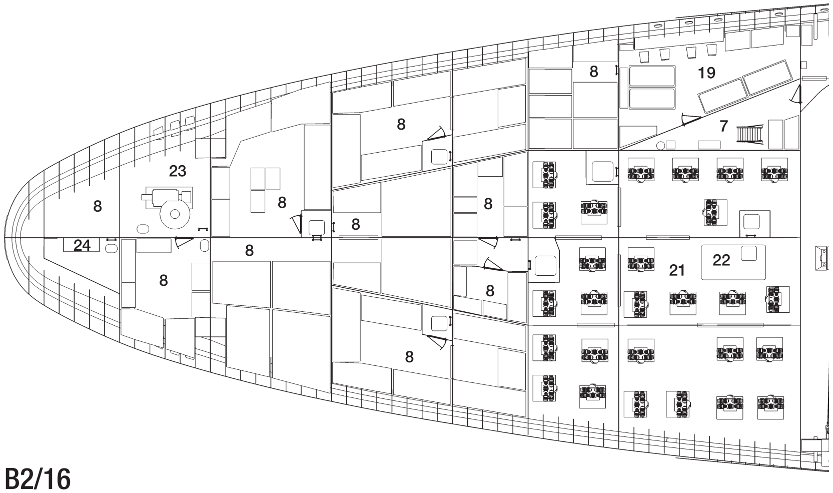
B2/15

DECK PLANS (1/300 SCALE)

B2/16 LOWER DECK, FRAMES 135–261

1 Middle elevator pit
2 Aft elevator pit
3 Middle elevator motor room
4 Aft elevator motor room
5 Engine room vent trunk
6 Boiler room vent trunk
7 Passage
8 Storage room
9 Dish washing room
10 Arrester gear motor room no. 5
11 Galley
12 Electric shop
13 Welding shop
14 Foundry
15 Repair workshop
16 Food storage
17 Warrant officer's mess
18 Enlisted men's quarters
19 Warrant officer's quarters
20 Office
21 Aircraft engine storage room
22 Engine transport hatch
23 Aft capstan motor room
24 Aft anchor chain locker
25 Carbon dioxide bottles
26 Bomb elevator trunk
27 12.7cm ammunition hoist
28 25mm ammunition hoist





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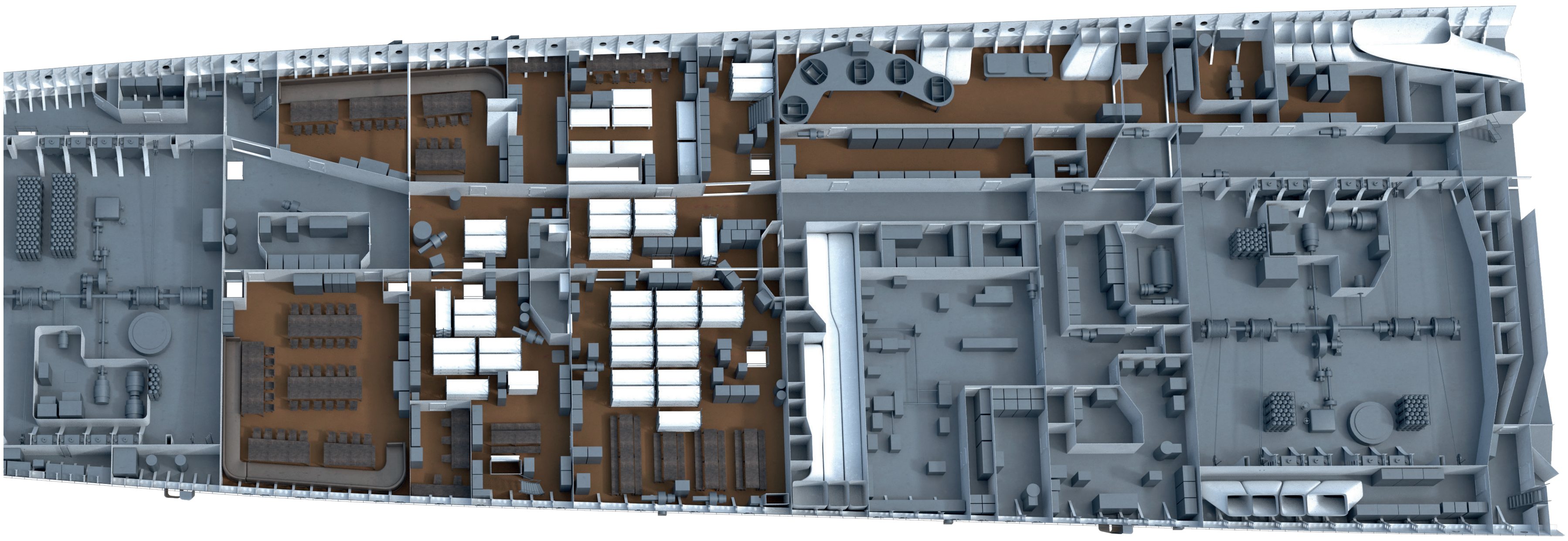

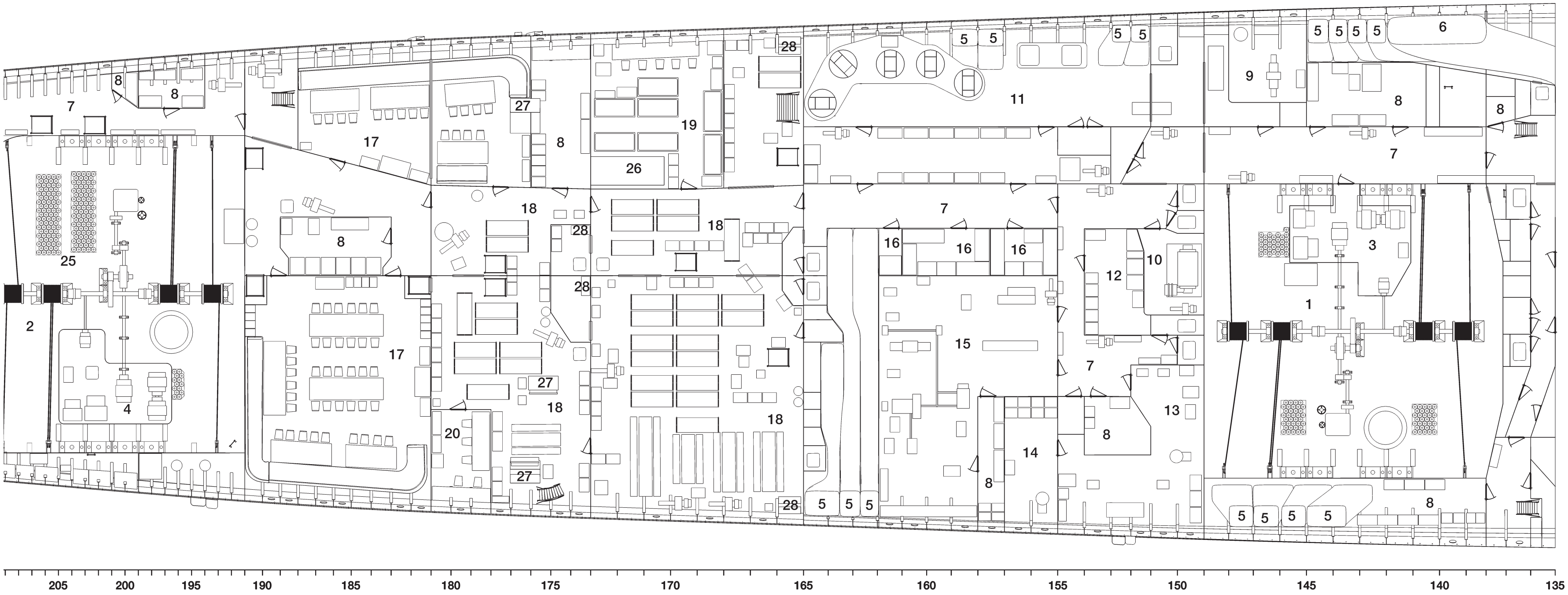

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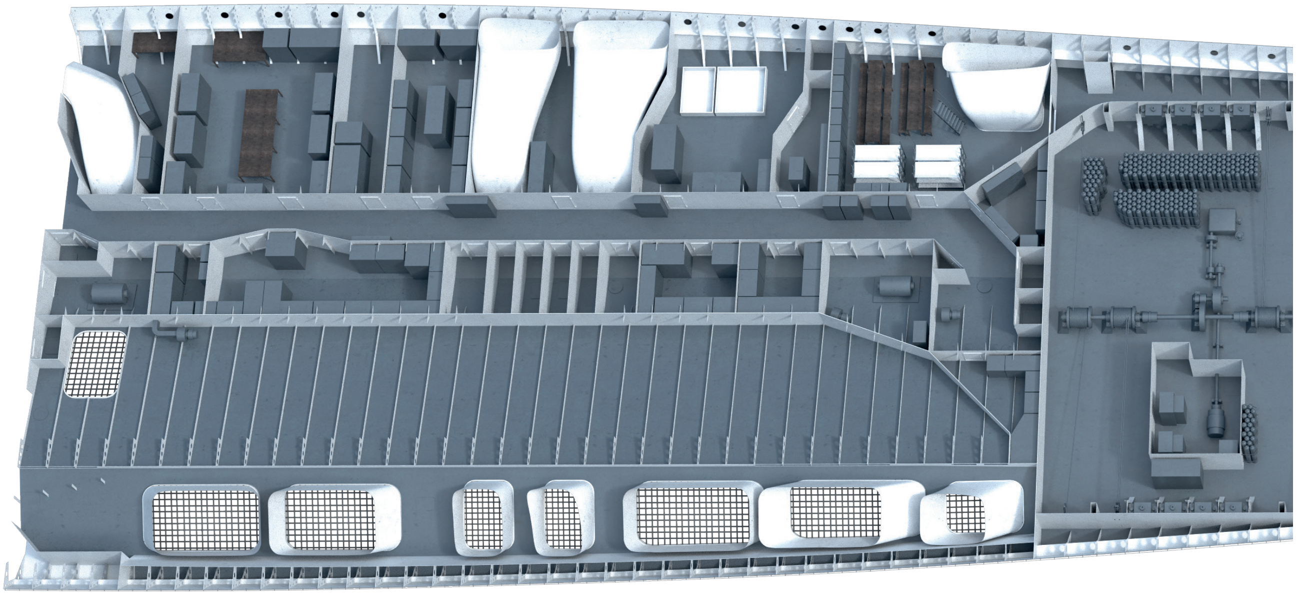
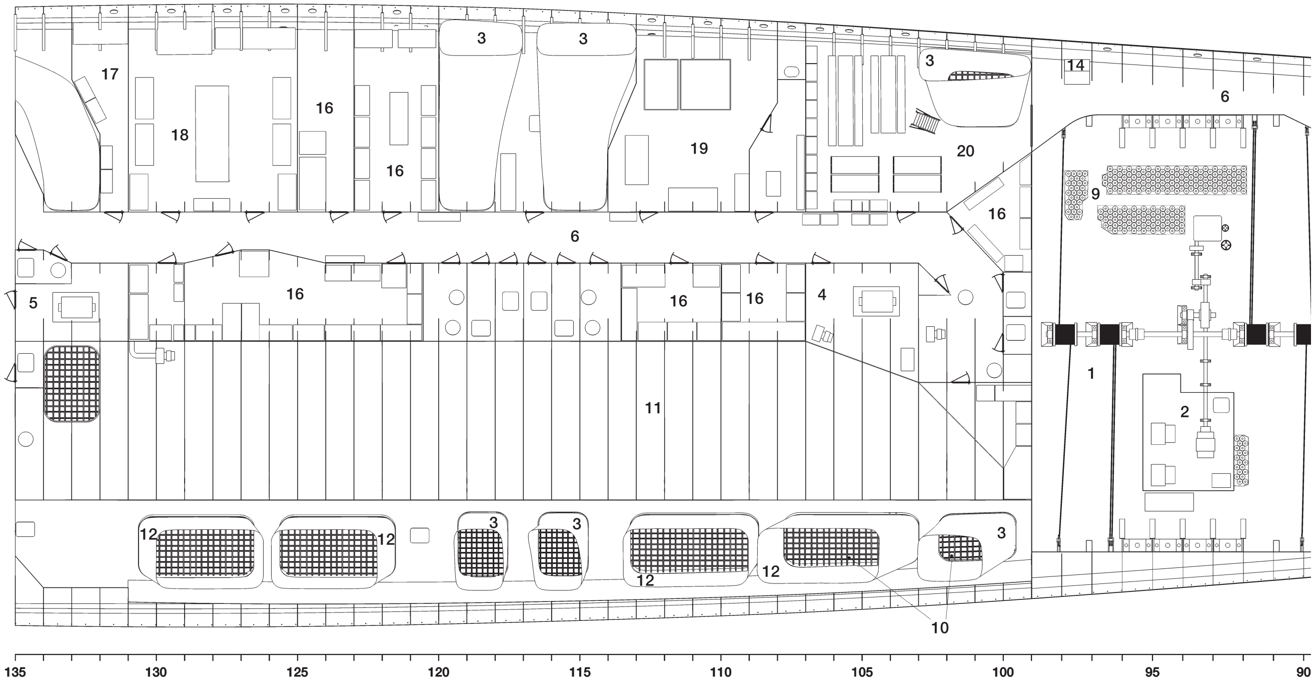
DECK PLANS (1/300 SCALE)

B2/17 LOWER DECK, FRAMES 0–135

1 Fore elevator pit
2 Fore elevator motor room
3 Boiler room vent trunk
4 Arrester gear motor room no. 3
5 Arrester gear motor room no. 4
6 Passage
7 Fore capstan motor room
8 Anchor chain locker
9 Carbon dioxide bottles
10 Armoured grating
11 Sloped deck above funnel uptakes
12 Funnel uptake
13 12.7cm ammunition hoist
14 25mm ammunition hoist
15 Torpedo and bomb elevator trunk
16 Storage room
17 Disinfection room
18 Officer's galley
19 Bathroom
20 Enlisted men's quarters
21 Officer's bathroom
22 Officer's mess
23 Officer's cabin
24 Gasoline storage room

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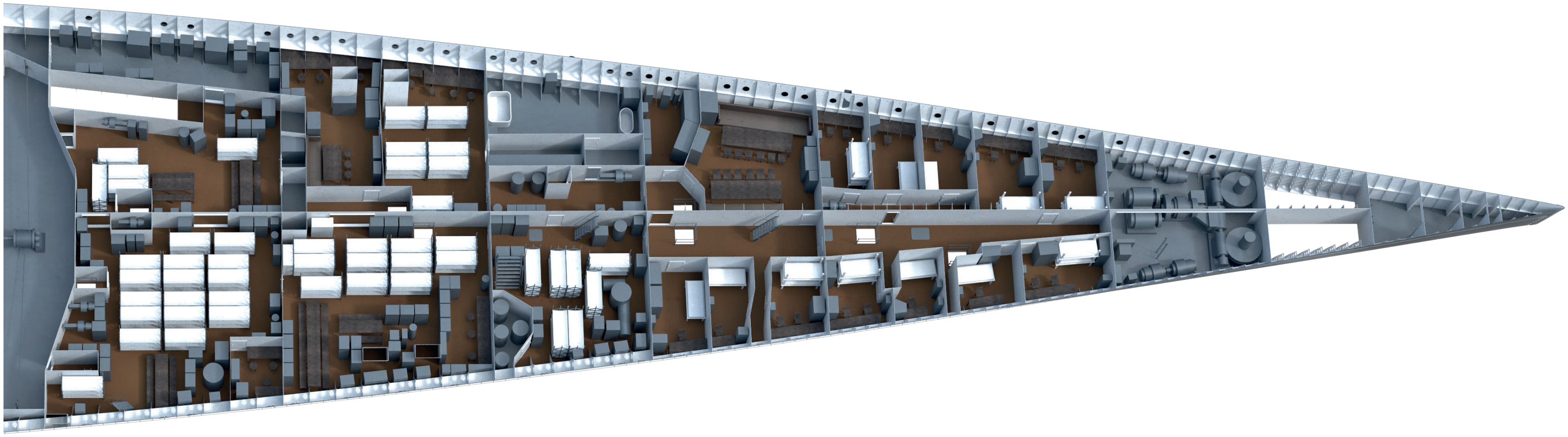

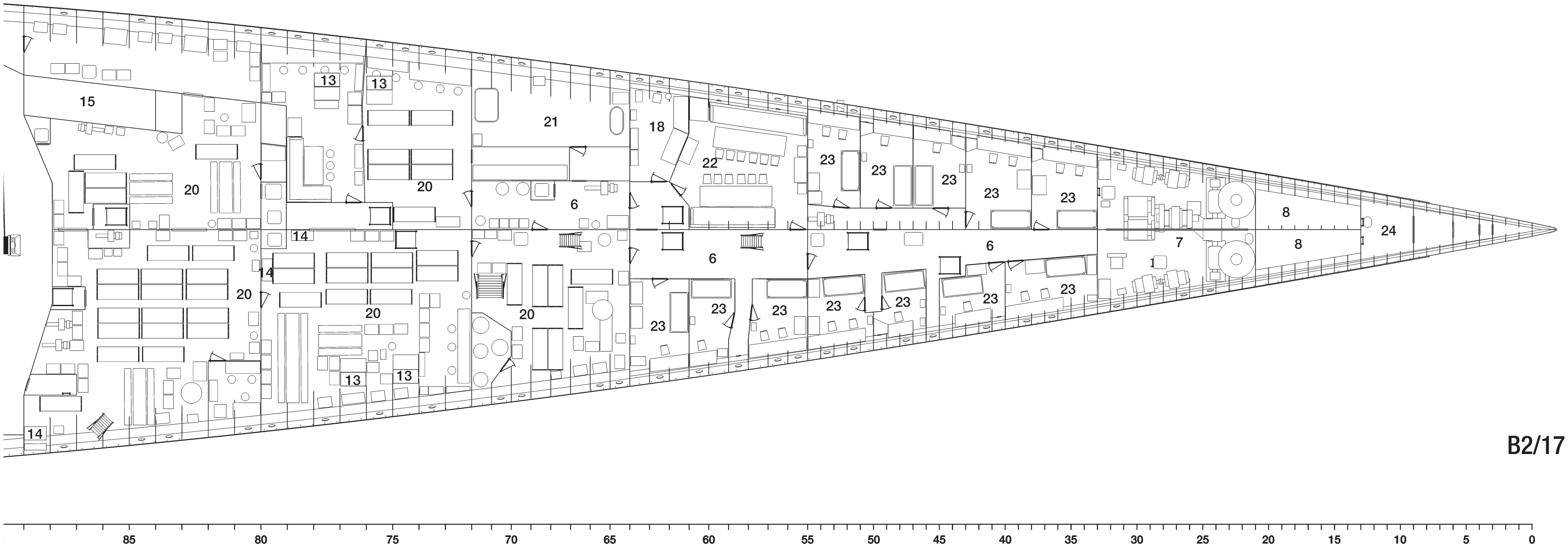
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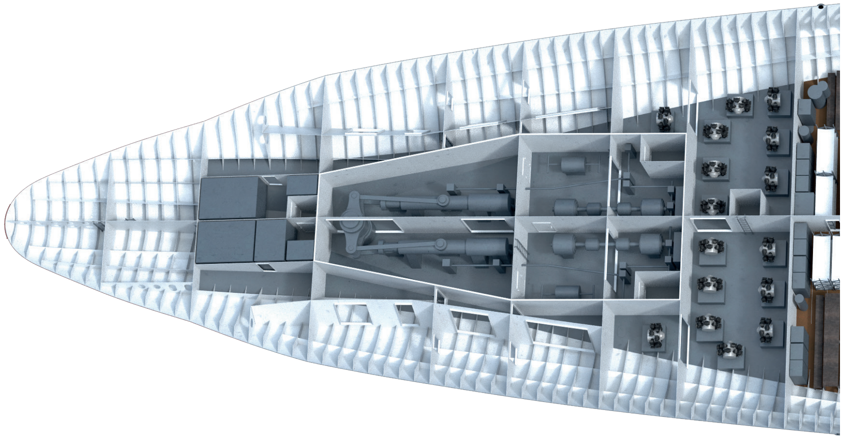
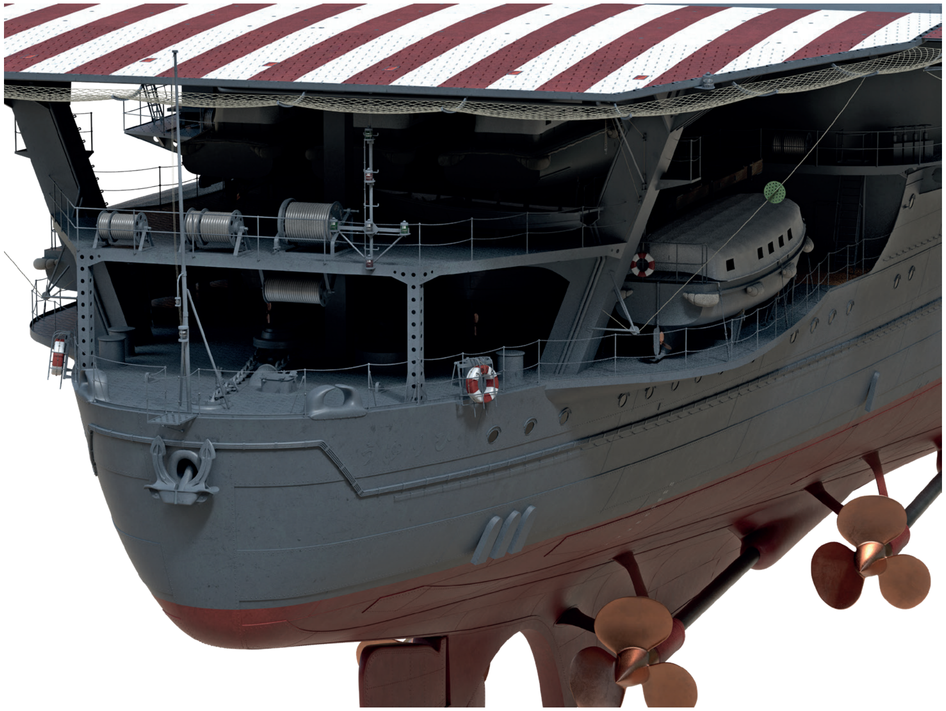
B2/17

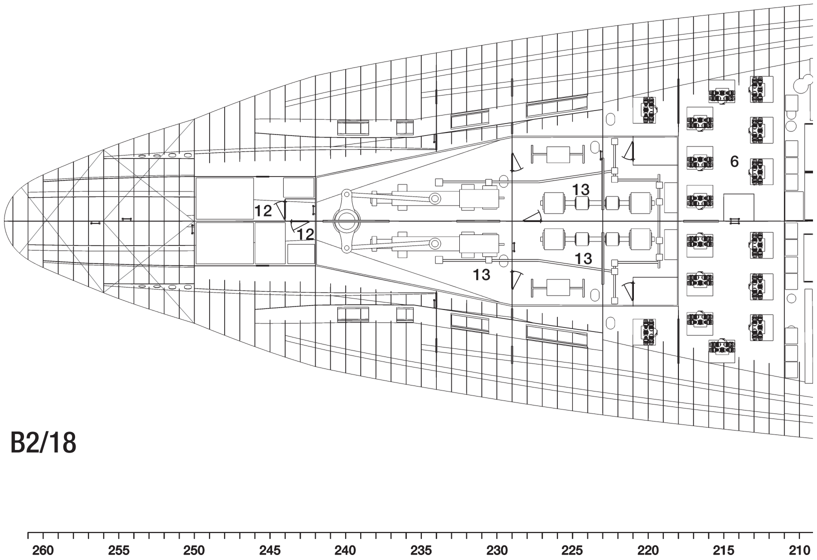
DECK PLANS (1/300 SCALE)

B2/18 BOTTOM DECK, FRAMES 135–261

1 Engine room vent trunk
2 Arrester gear motor room no. 6
3 Arrester gear motor room no. 7
4 Arrester gear motor room no. 8
5 Arrester gear motor room no. 9
6 Aircraft engine storage room
7 12.7cm ammunition hoist
8 25mm ammunition hoist
9 Bomb elevator trunk
10 Electric generator room containing a single turbogenerator
11 Enlisted men's quarters
12 Food storage room
13 Steering engine room
14 Engine room no. 1
15 Engine room no. 2
16 Engine room no. 3
17 Engine room no. 4
18 Steam line







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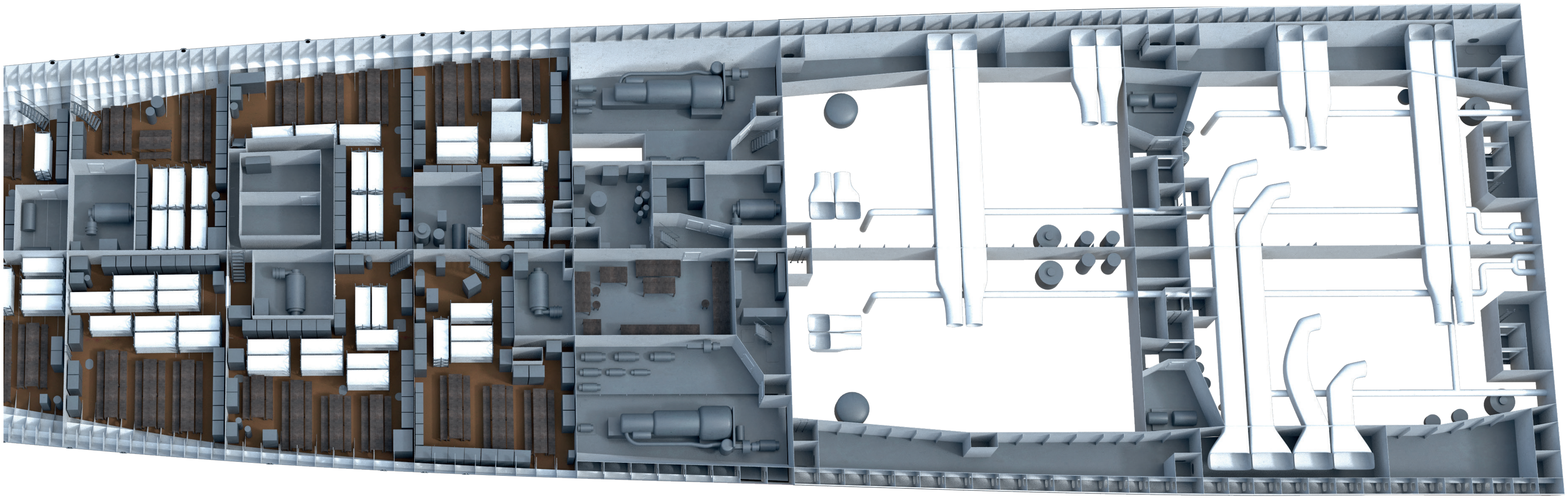

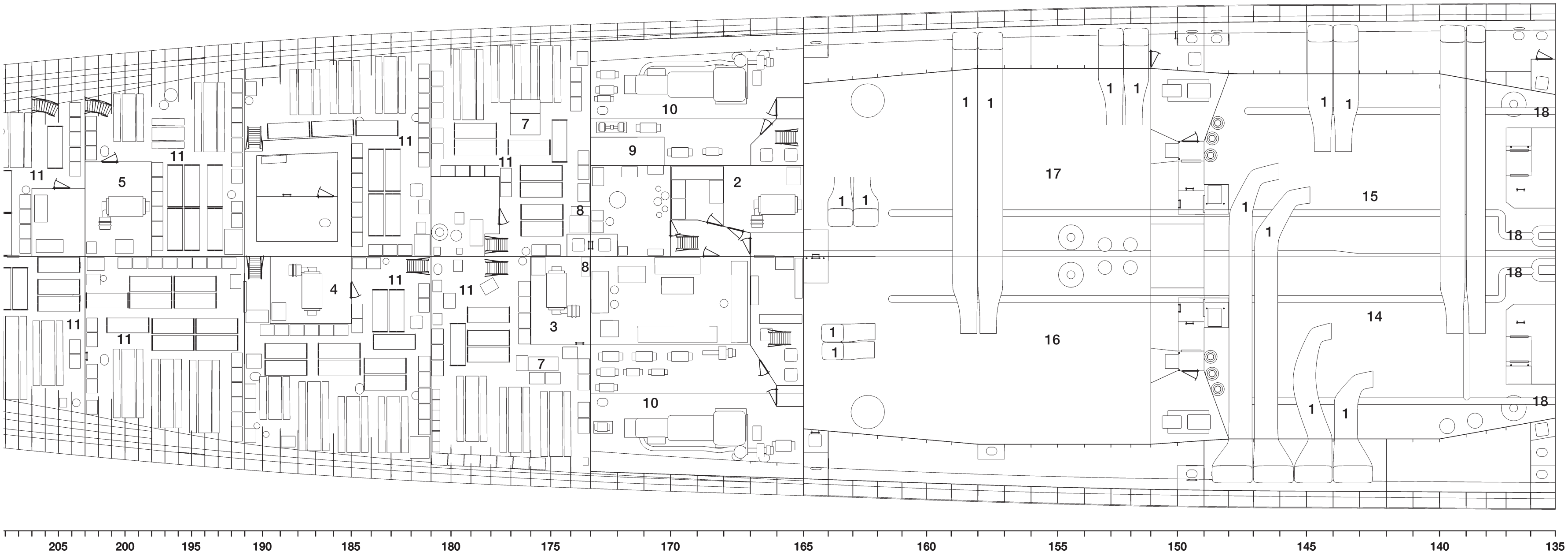
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DECK PLANS (1/300 SCALE)

B2/19 BOTTOM DECK, FRAMES 0–135

1 Boiler room vent trunk
2 Funnel uptake
3 Arrester gear motor room no. 1
4 Arrester gear motor room no. 2
5 Passage
6 12.7cm ammunition hoist
7 25mm ammunition hoist
8 Torpedo and bomb elevator trunk
9 Storage room
10 Fuel tank
11 Fuel pump room
12 Torpedo magazine (upper level)
13 Torpedo maintenance shop
14 Enlisted men's quarters
15 Radio room
16 Trim tank
17 Anchor cable locker
18 Intermediate deck under funnel uptakes
19 Boiler room no. 1
20 Boiler room no. 2
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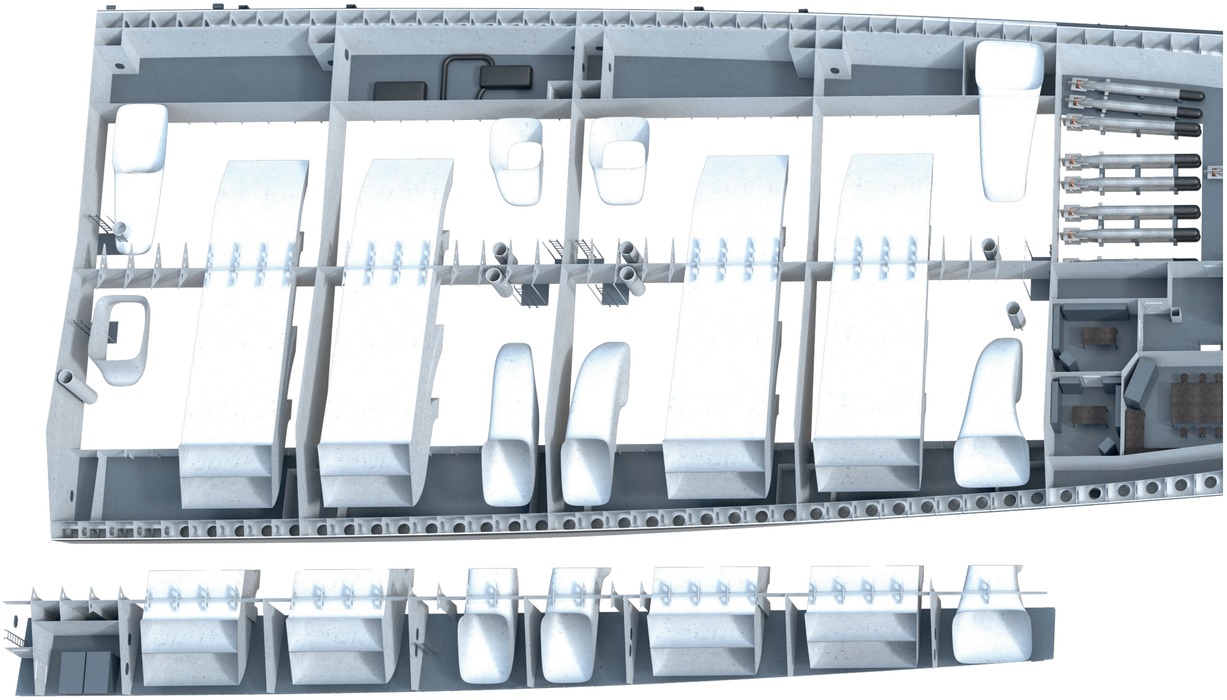
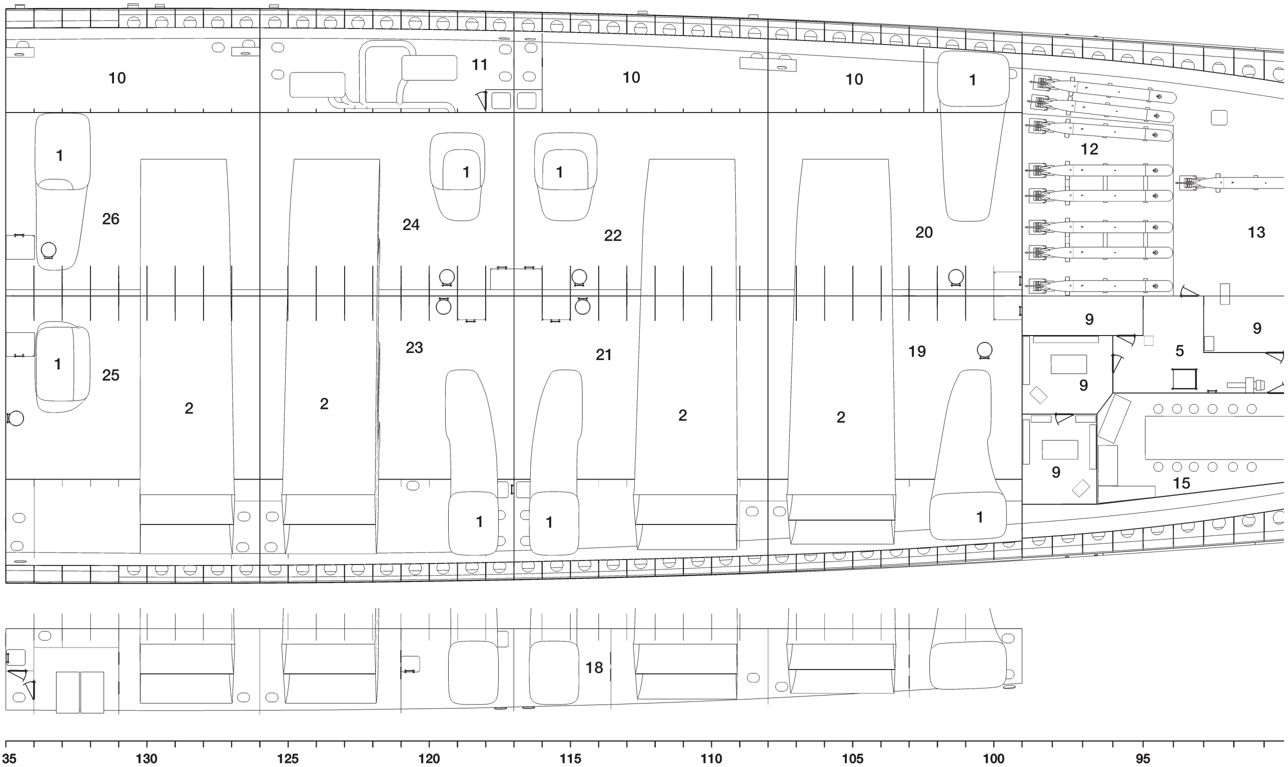
22 Boiler room no. 4
23 Boiler room no. 5
24 Boiler room no. 6
25 Boiler room no. 7
26 Boiler room no. 8

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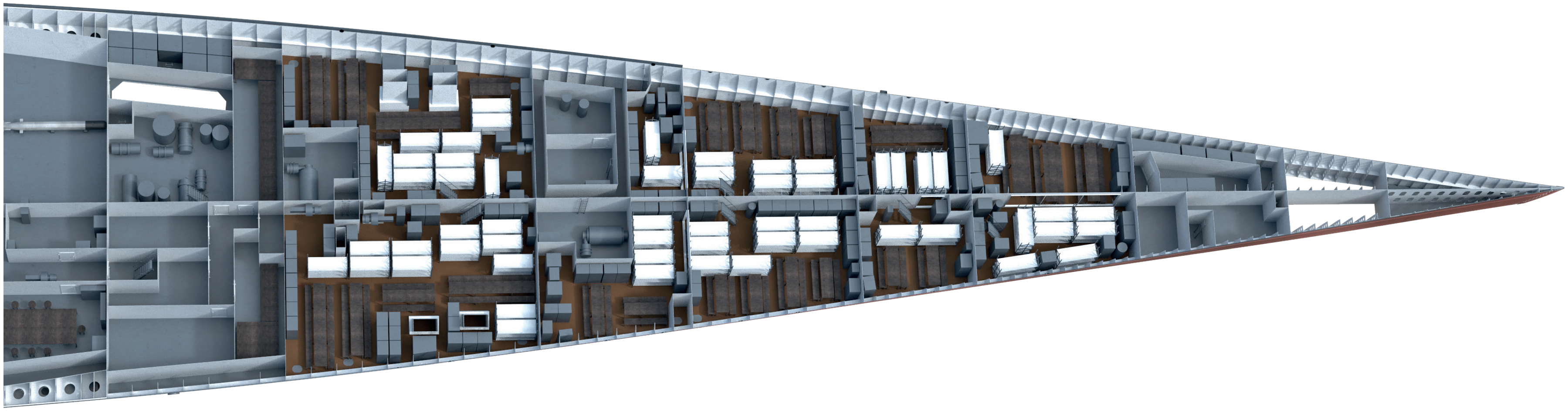

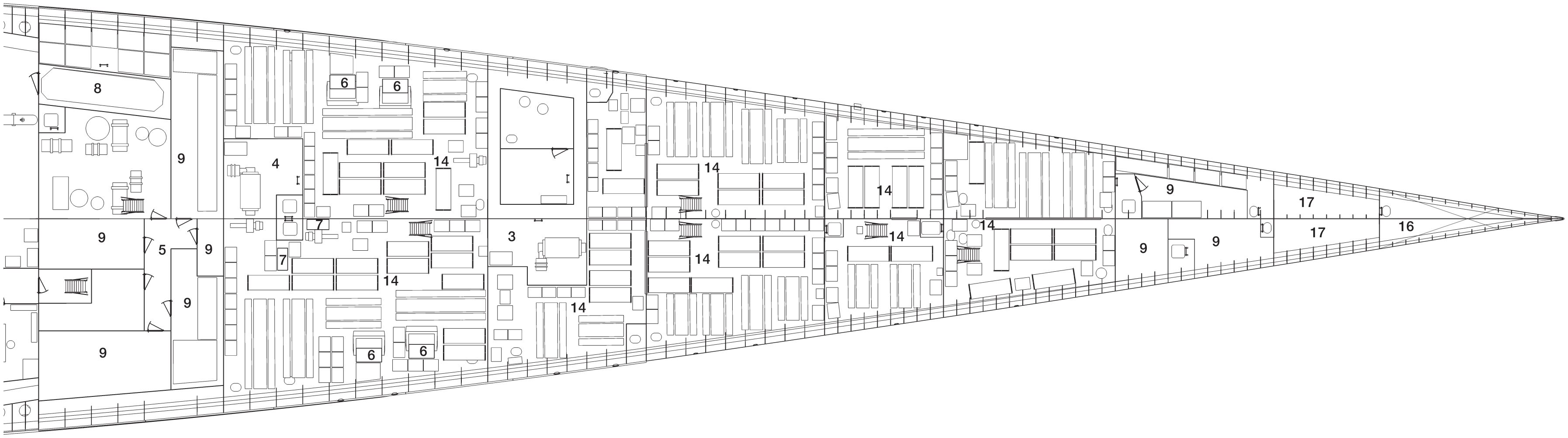
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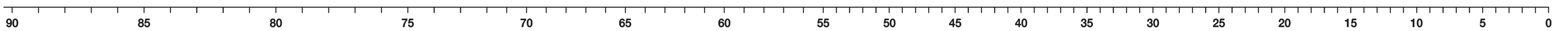
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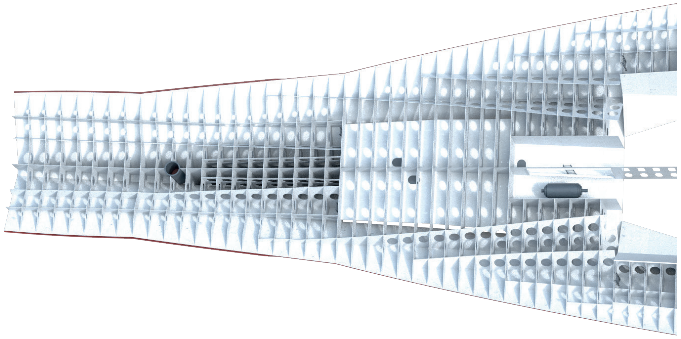
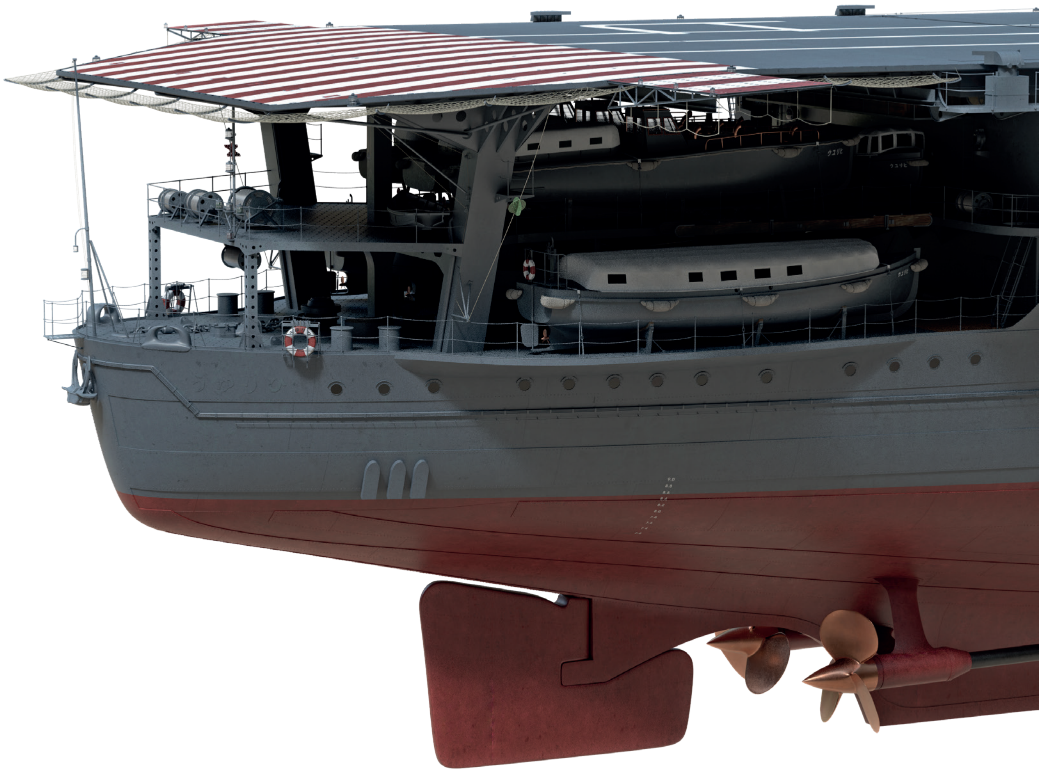
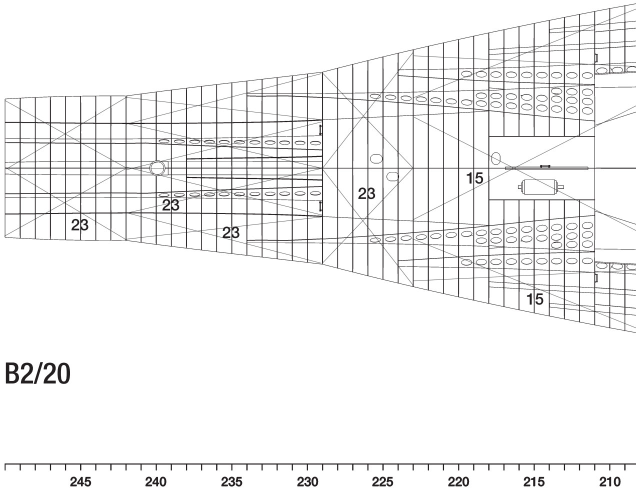
DECK PLANS (1/300 SCALE)

B2/20 TANK DECK, FRAMES 135–261

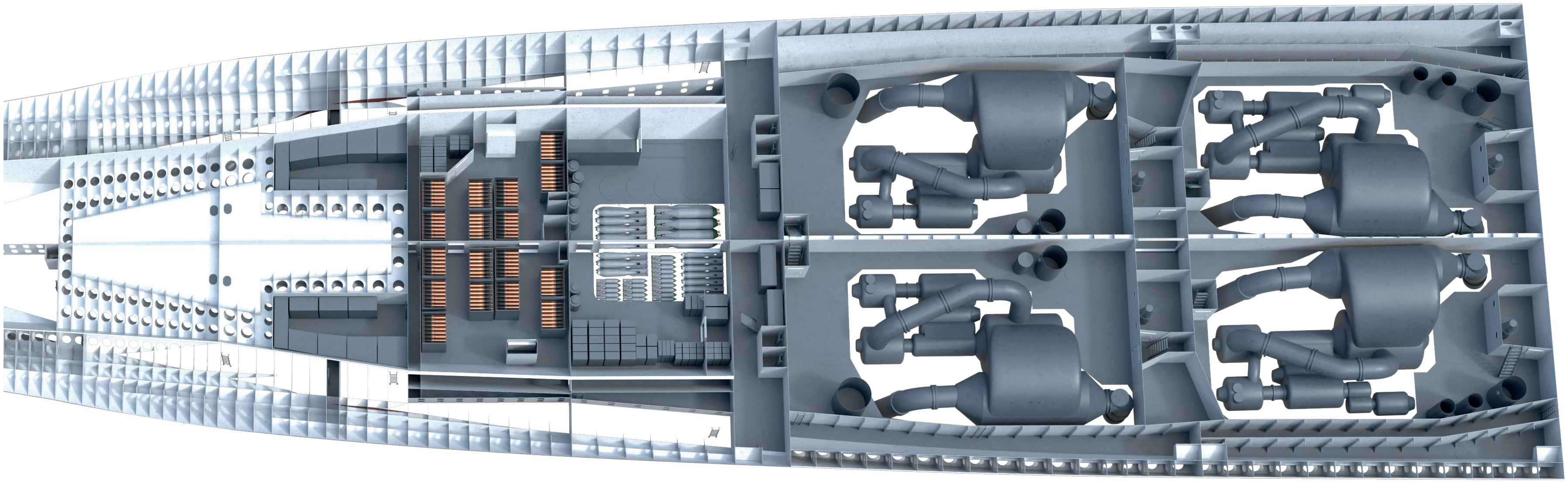
- **1** 12.7cm ammunition hoist
- **2** Aft 12.7cm ammunition magazine
- **3** 25mm ammunition hoist
- **4** Bomb elevator trunk
- **5** Aft bomb magazine (upper level)
- **6** Storage room
- **7** Engine room no. 1
- **8** Engine room no. 2
- **9** Engine room no. 3
- **10** Engine room no. 4
- **11** Avgas tank no. 6
- **12** Avgas tank no. 7
- **13** Avgas tank no. 8
- **14** Avgas tank no. 9
- **15** Fuel tank
- **16** Condenser
- **17** Low pressure turbine
- **18** Intermediate pressure turbine
- **19** High pressure turbine
- **20** Cruising turbine
- **21** Main reduction gear
- **22** Cruising turbine reduction gear
- **23** Trim tank
- **24** Engine control room

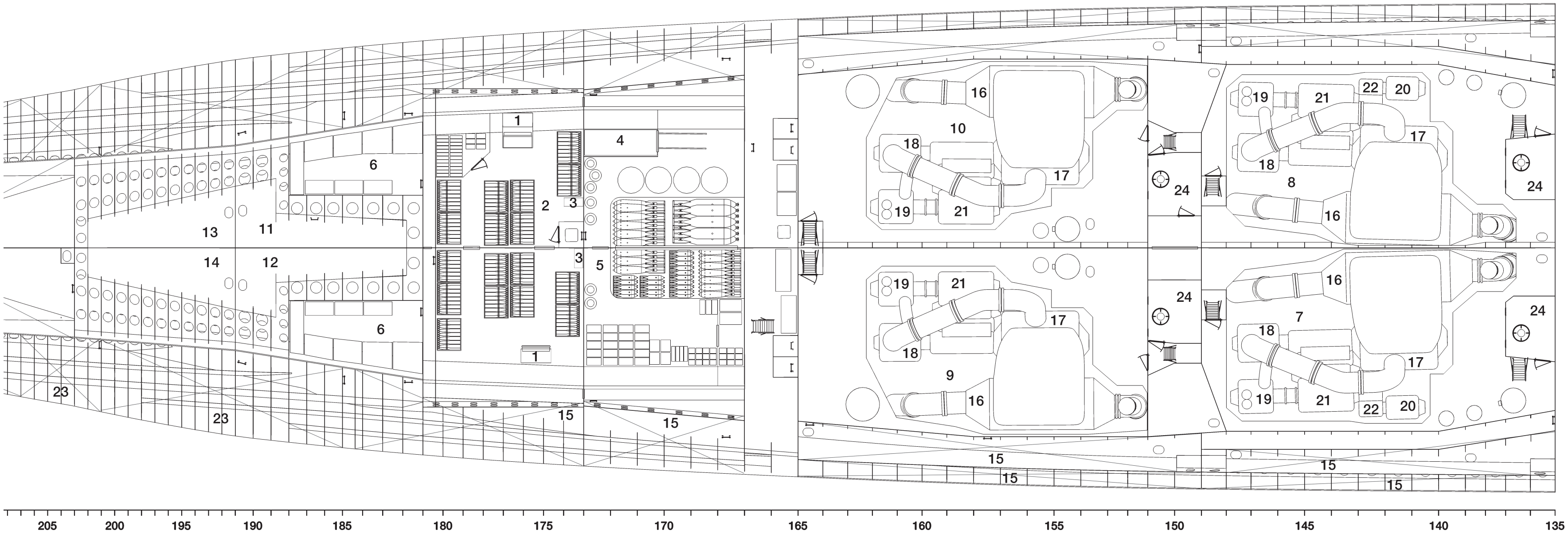






B2/20

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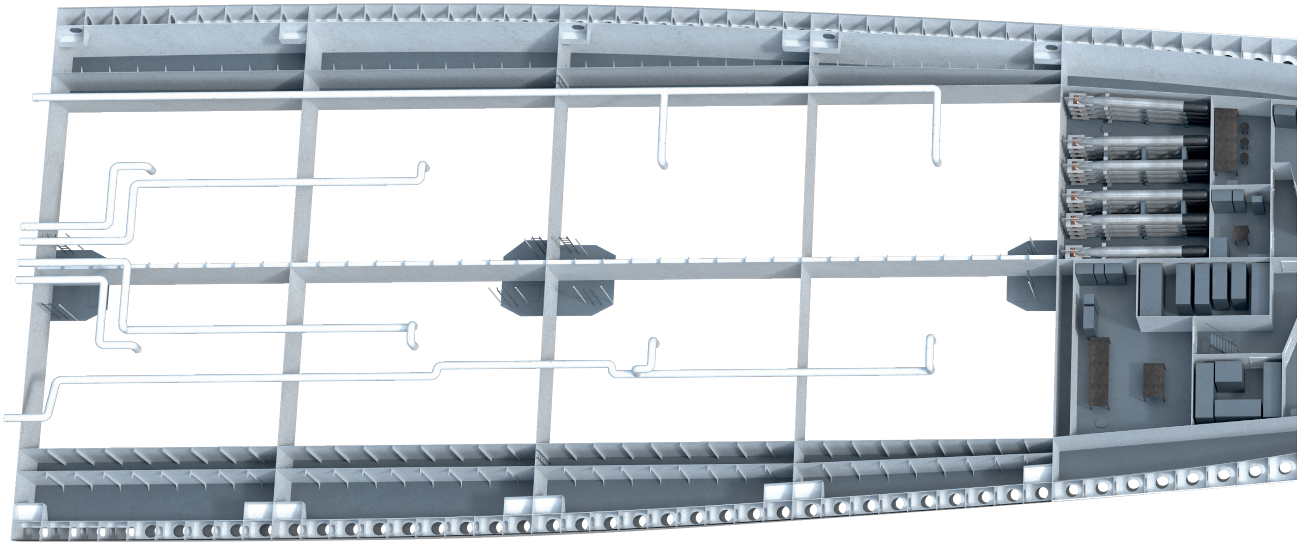
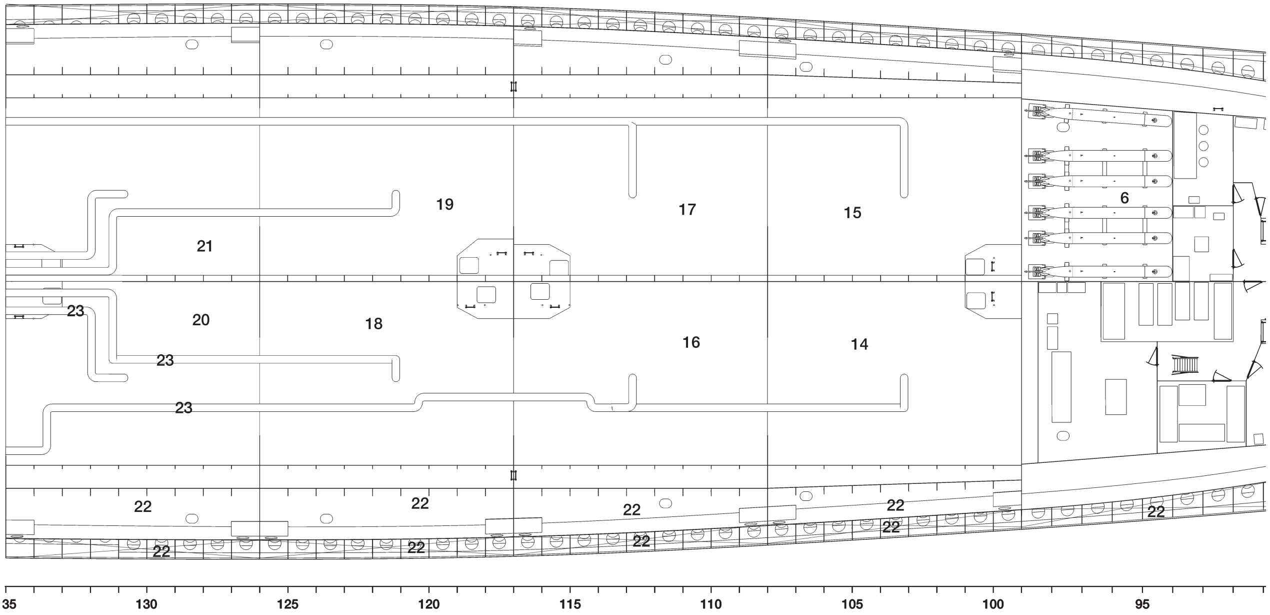
DECK PLANS (1/300 SCALE)

B2/21 TANK DECK, FRAMES 0–135

1 12.7cm ammunition hoist
2 25mm ammunition hoist
3 Torpedo and bomb elevator trunk
4 Fore 12.7cm ammunition magazine
5 Fore bomb magazine (upper level)
6 Torpedo magazine (lower level)
7 Trim tank
8 Avgas tank no. 1
9 Avgas tank no. 2
10 Avgas tank no. 3
11 Avgas tank no. 4
12 Avgas tank no. 5
13 Anchor cable locker
14 Boiler no. 1
15 Boiler no. 2
16 Boiler no. 3
17 Boiler no. 4
18 Boiler no. 5
19 Boiler no. 6
20 Boiler no. 7
21 Boiler no. 8
22 Fuel tank
23 Steam line
24 Fuel pump room

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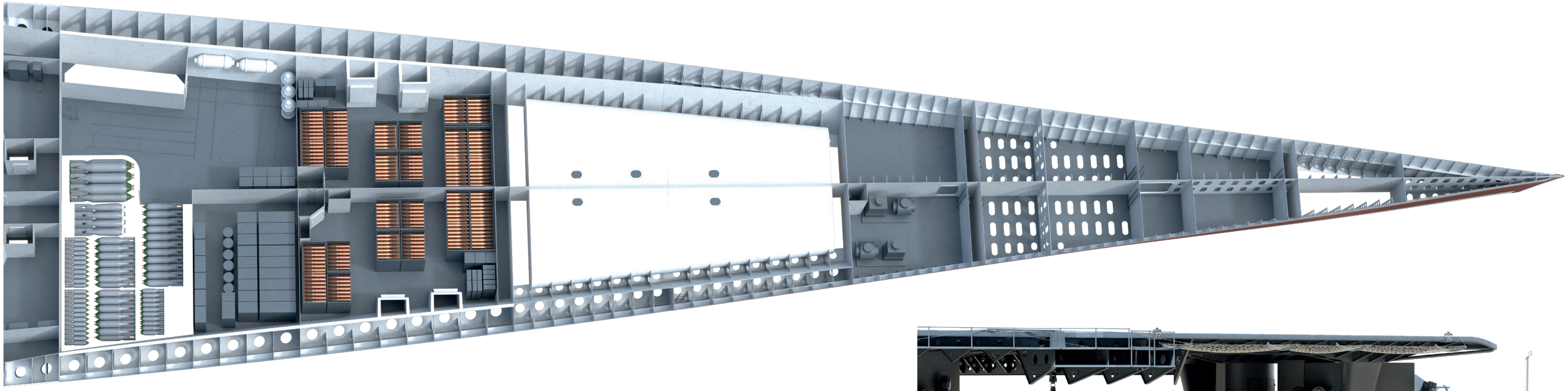

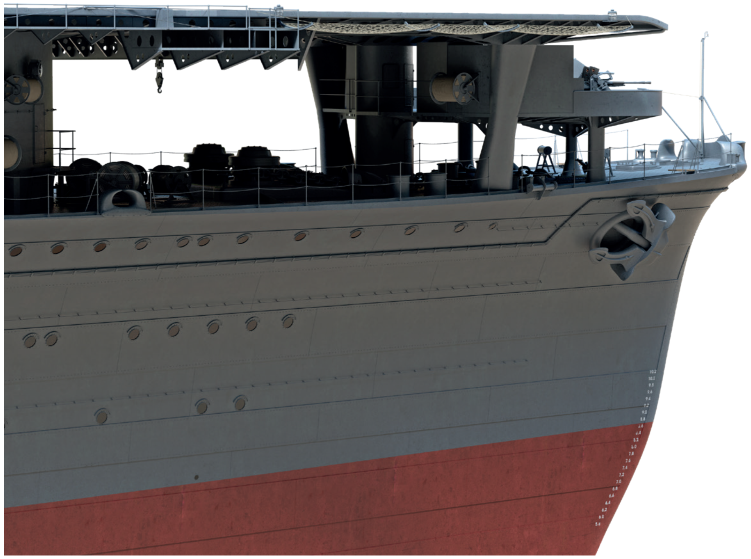

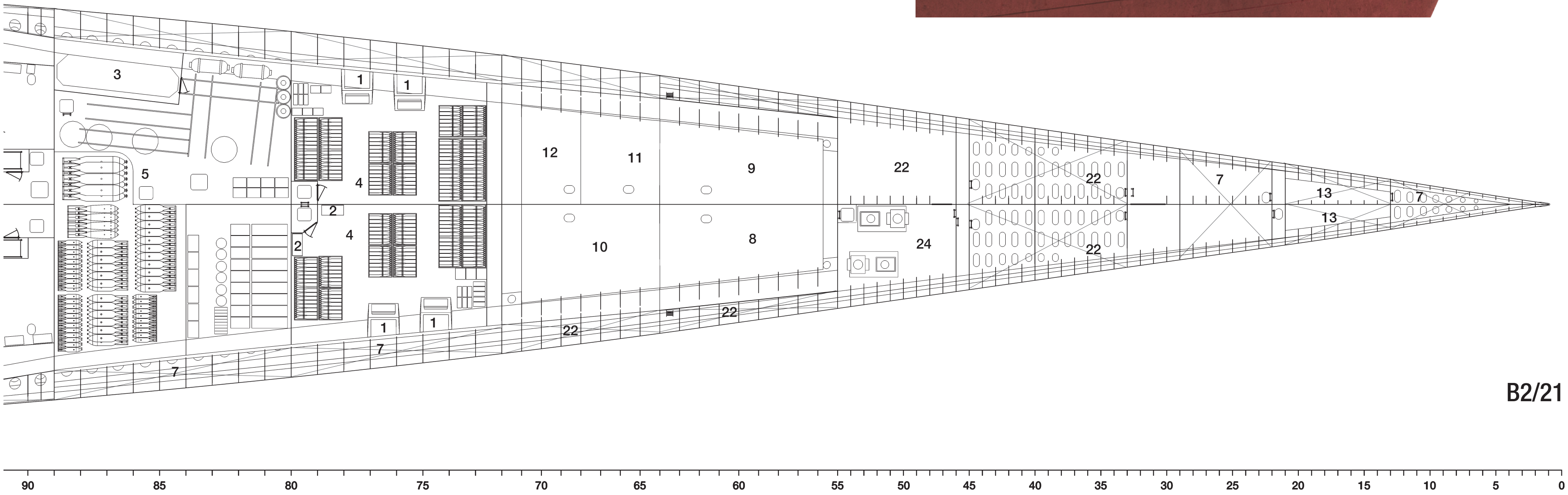

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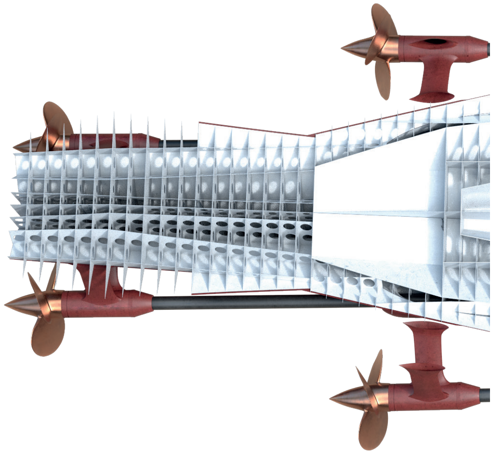
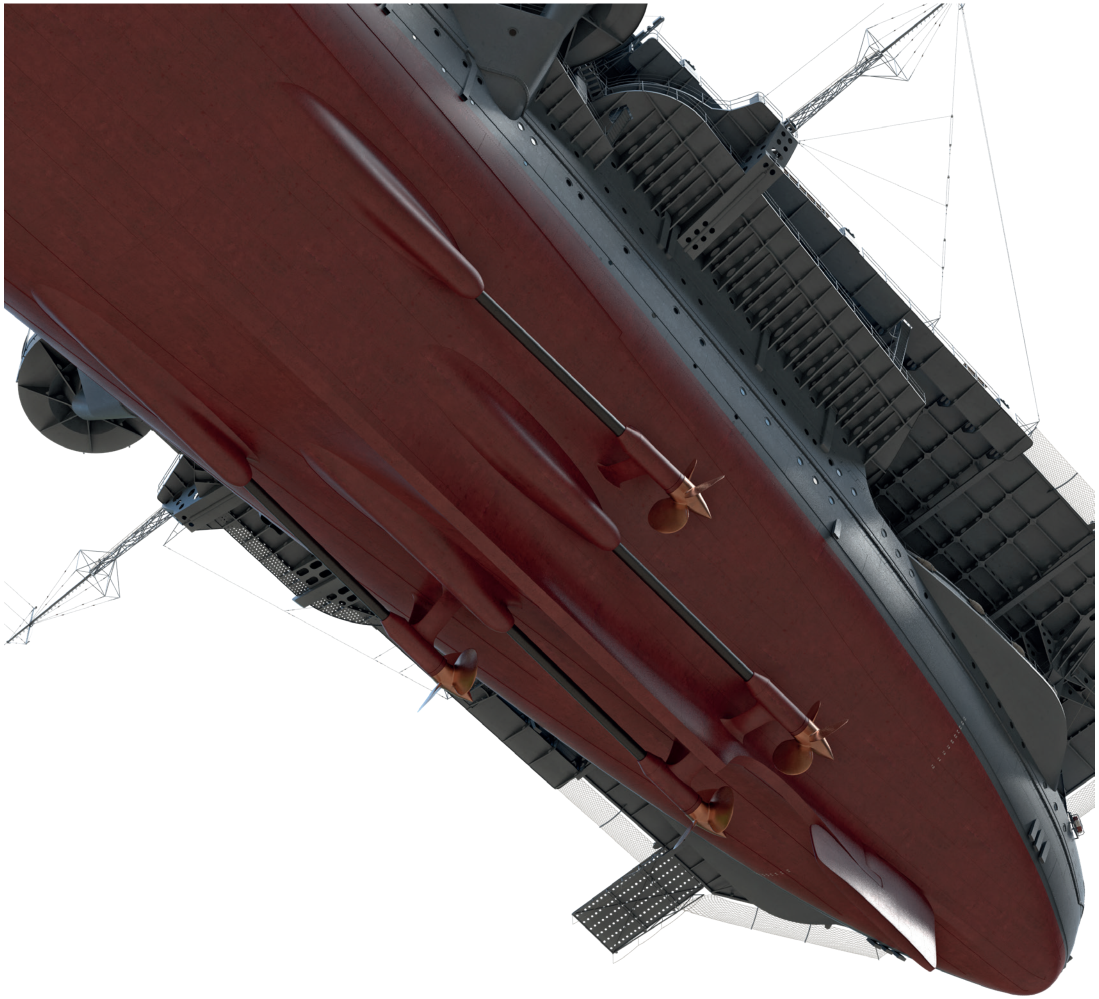
B2/21

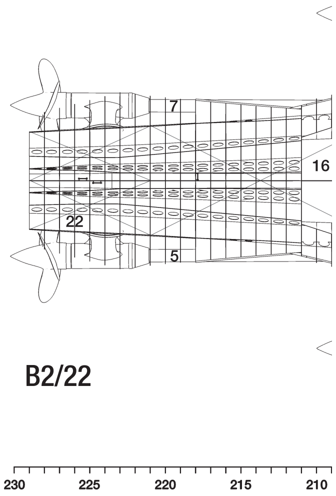
DECK PLANS (1/300 SCALE)

B2/22 LOWER TANK DECK, FRAMES 135–261

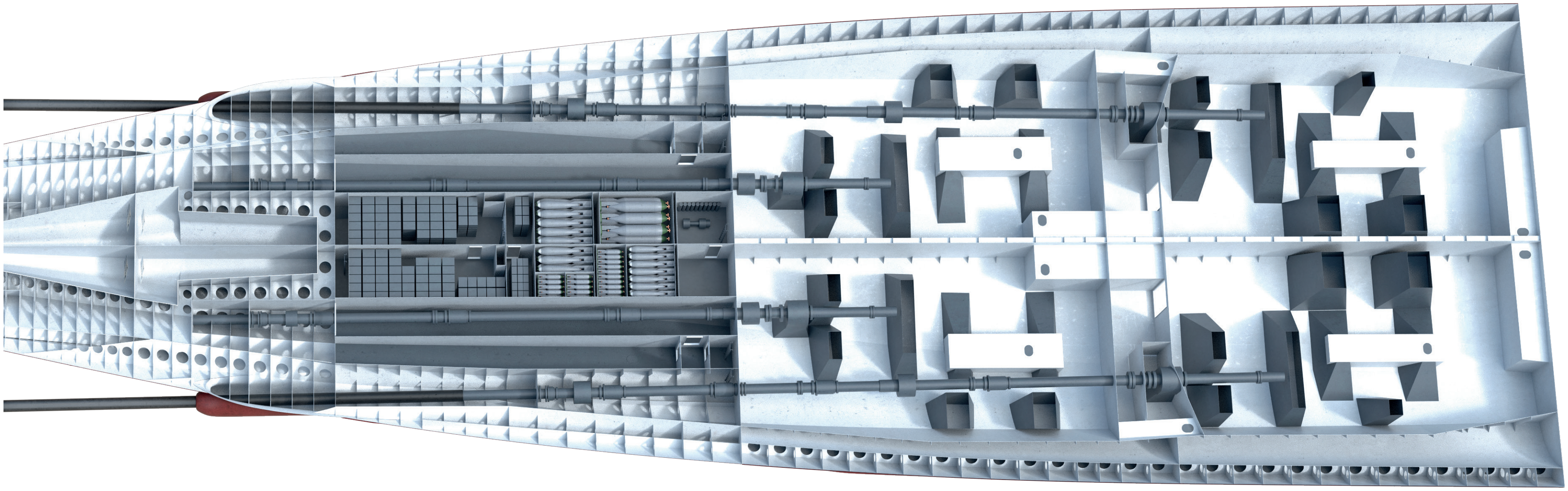
1 Aft bomb magazine (lower level)
2 Aft 25mm ammunition magazine
3 25mm ammunition hoist
4 Starboard outer propeller shaft
5 Starboard inner propeller shaft
6 Port outer propeller shaft
7 Port inner propeller shaft
8 Engine room no. 1
9 Engine room no. 2
10 Engine room no. 3
11 Engine room no. 4
12 Avgas tank no. 6
13 Avgas tank no. 7
14 Avgas tank no. 8
15 Avgas tank no. 9
16 Fuel tank
17 Turbine set support
18 Lubricating oil tank
19 Water tank
20 Electric cable passage
21 Propeller shaft tunnel
22 Trim tank

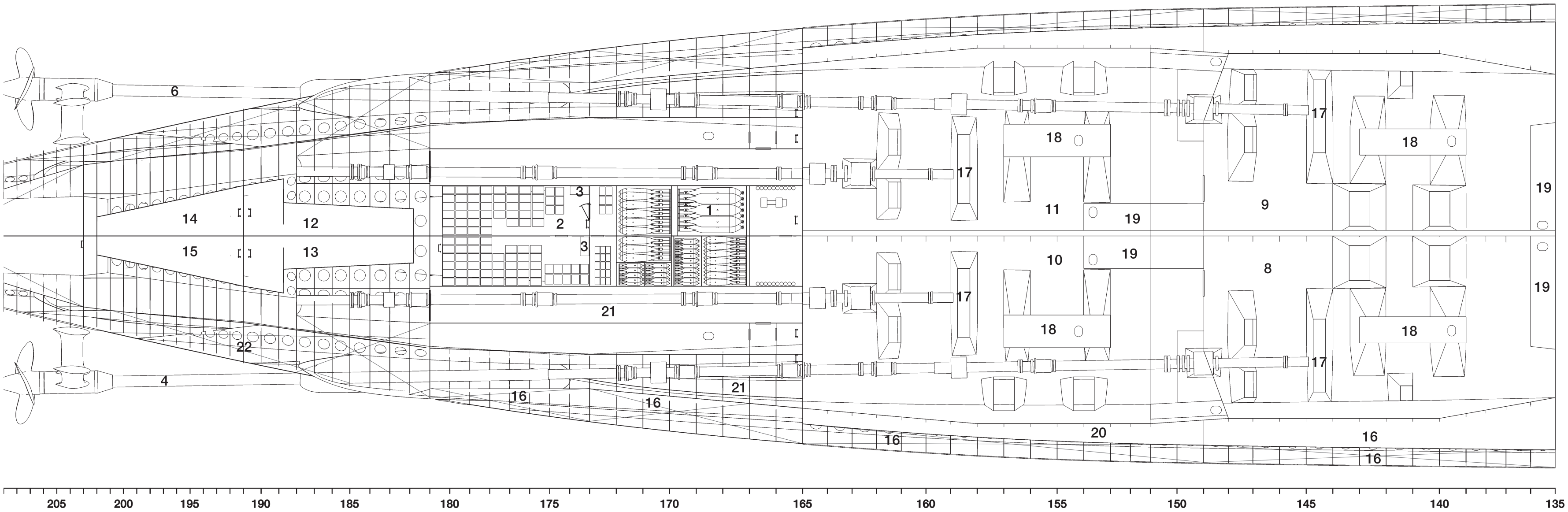






B2/22

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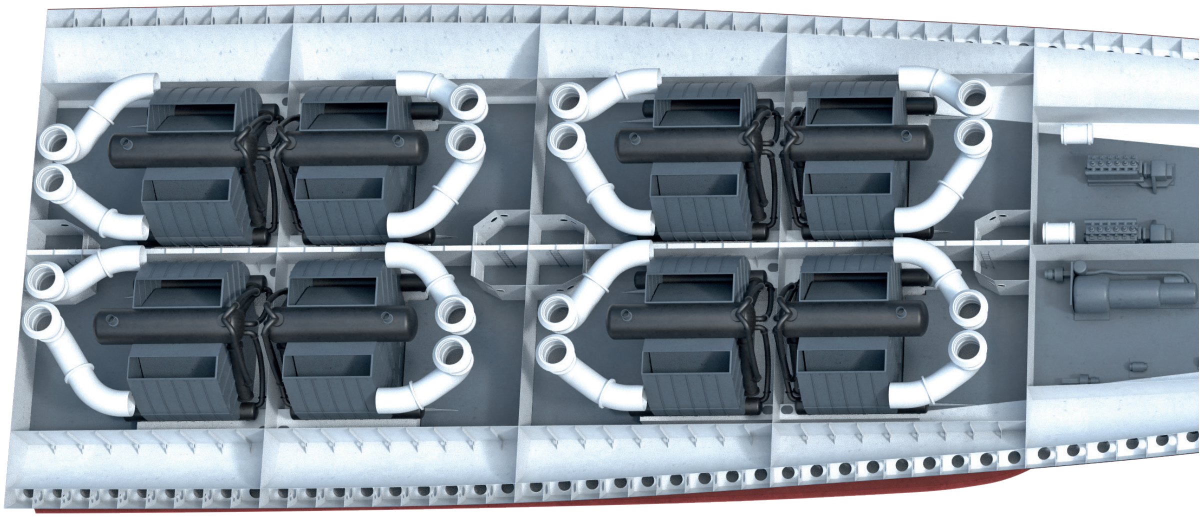
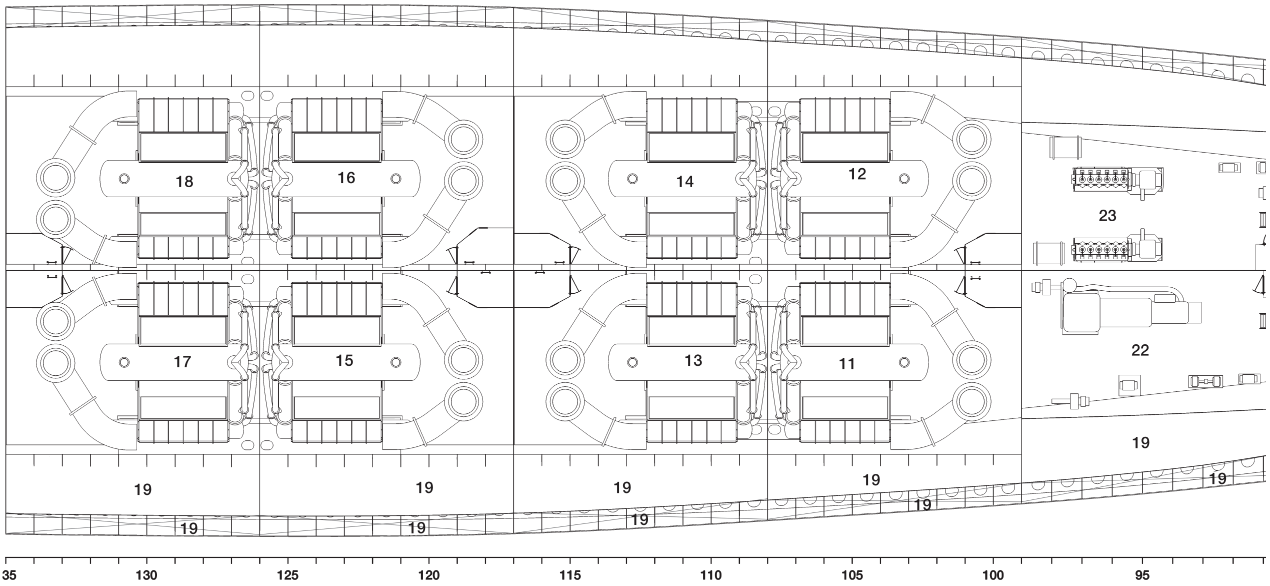
DECK PLANS (1/300 SCALE)

B2/23 LOWER TANK DECK, FRAMES 0–135

1 25mm ammunition hoist
2 Fore 25mm ammunition magazine
3 Fore bomb magazine (lower level)
4 Trim tank
5 Avgas tank no. 1
6 Avgas tank no. 2
7 Avgas tank no. 3
8 Avgas tank no. 4
9 Avgas tank no. 5
10 Anchor cable locker
11 Boiler no. 1
12 Boiler no. 2
13 Boiler no. 3
14 Boiler no. 4
15 Boiler no. 5
16 Boiler no. 6
17 Boiler no. 7
18 Boiler no. 8
19 Fuel tank
20 Torpedo and bomb elevator trunk
21 Storage room
22 Electric generator room containing a single turbogenerator
23 Electric generator room containing two diesel generators
24 Fuel pump room

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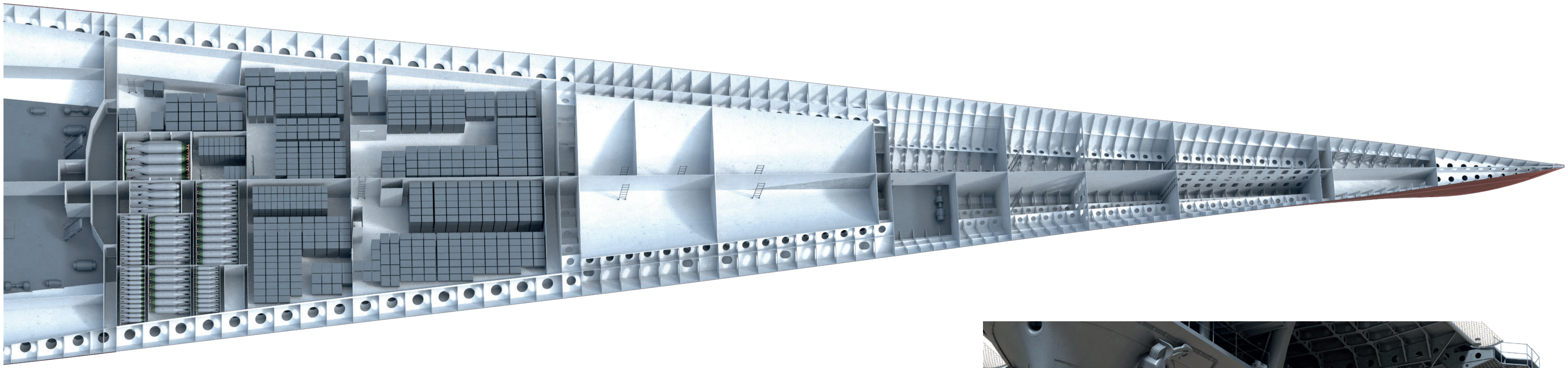

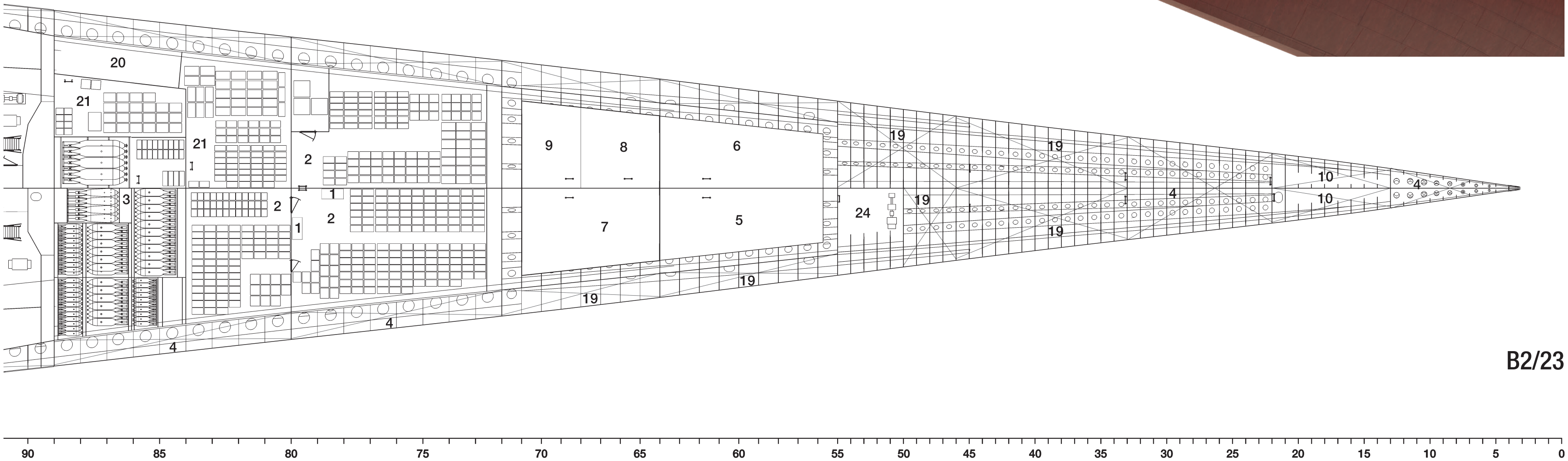
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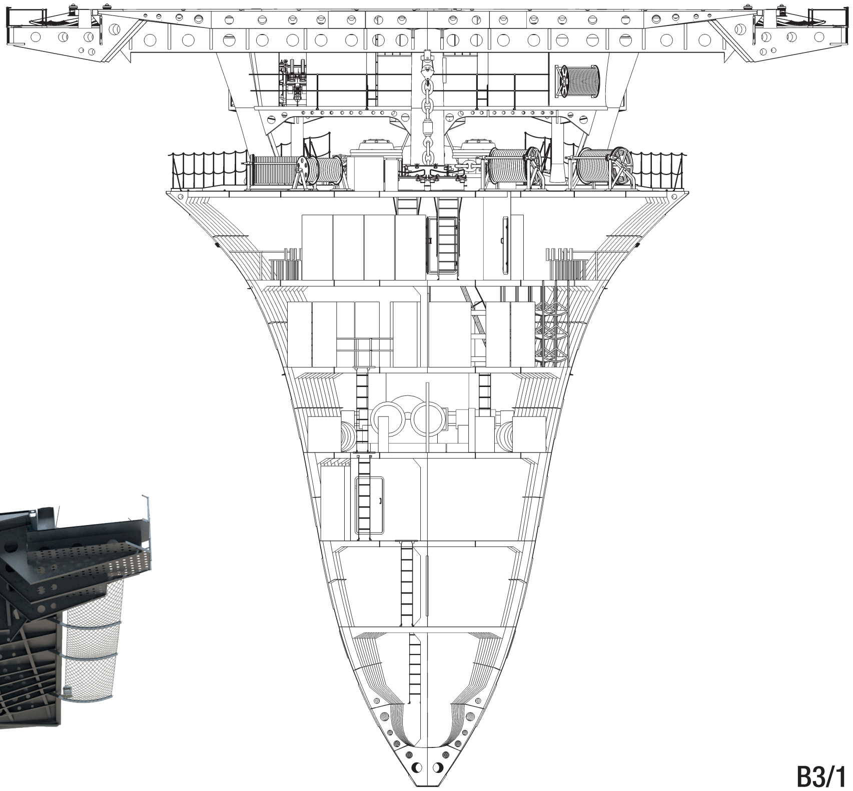
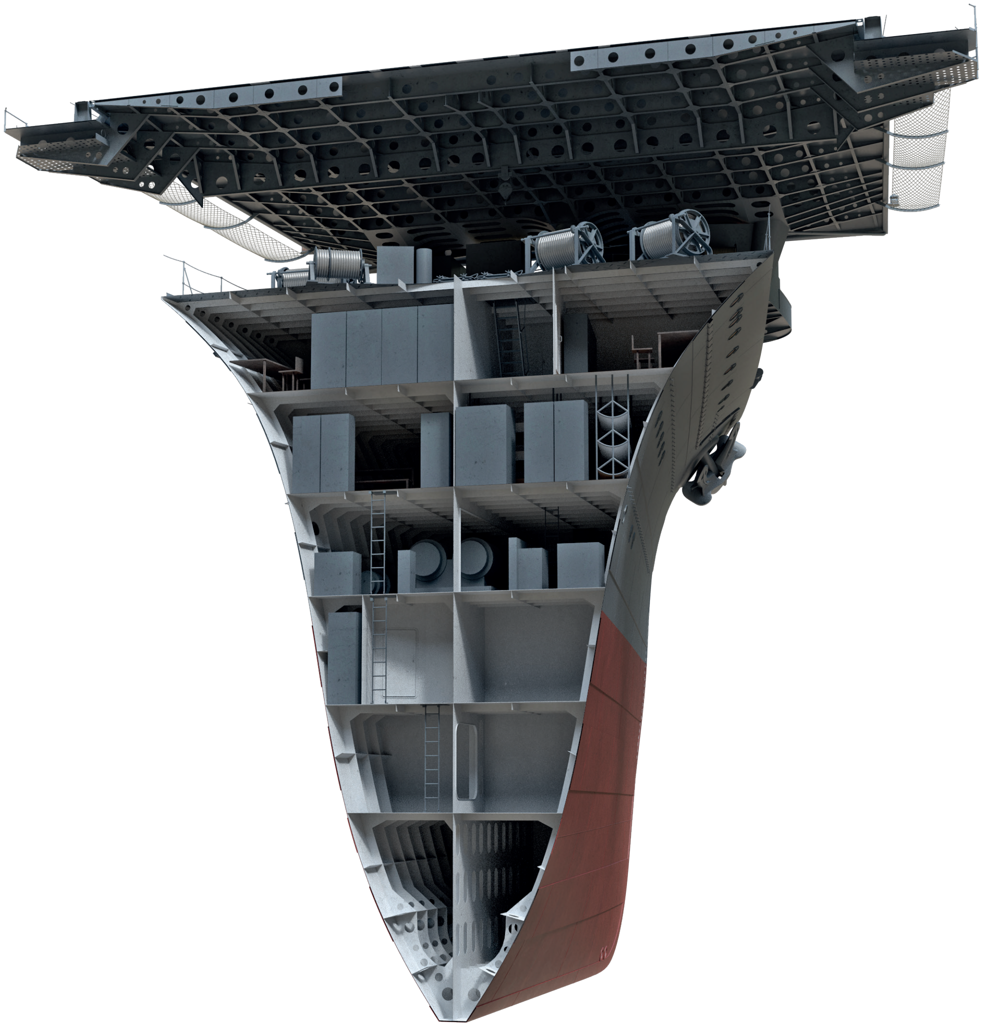
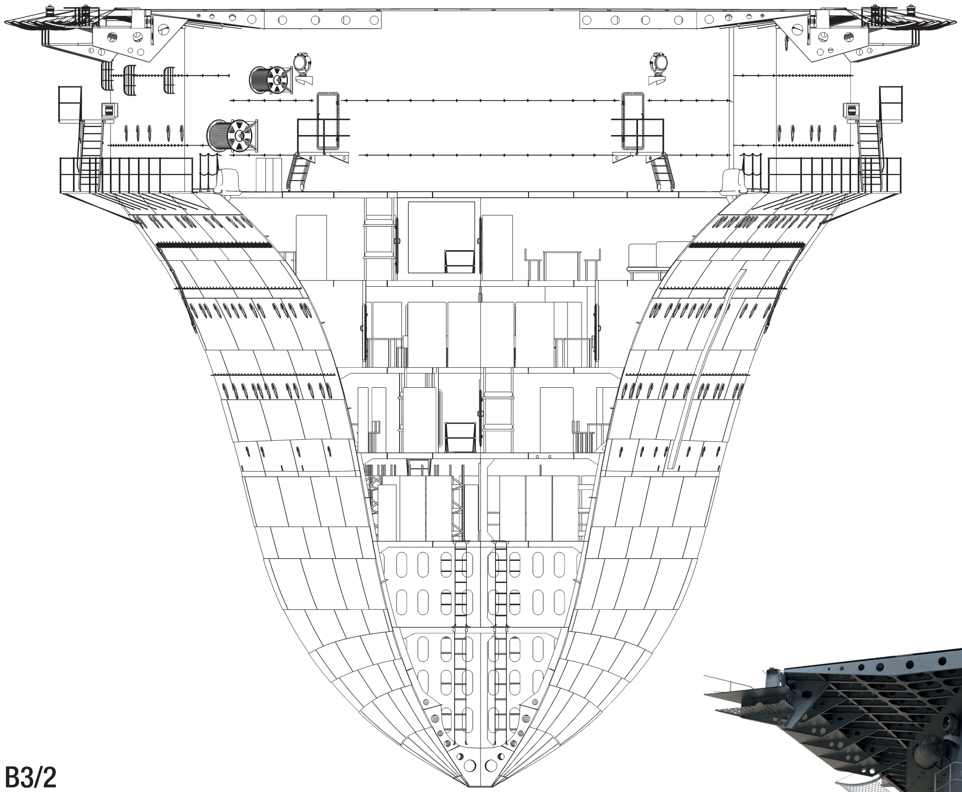
B2/23

TRANSVERSE SECTIONS (1/200 SCALE)
B3/1 FRAME 33 LOOKING FORWARD
B3/2 FRAME 33 LOOKING AFT

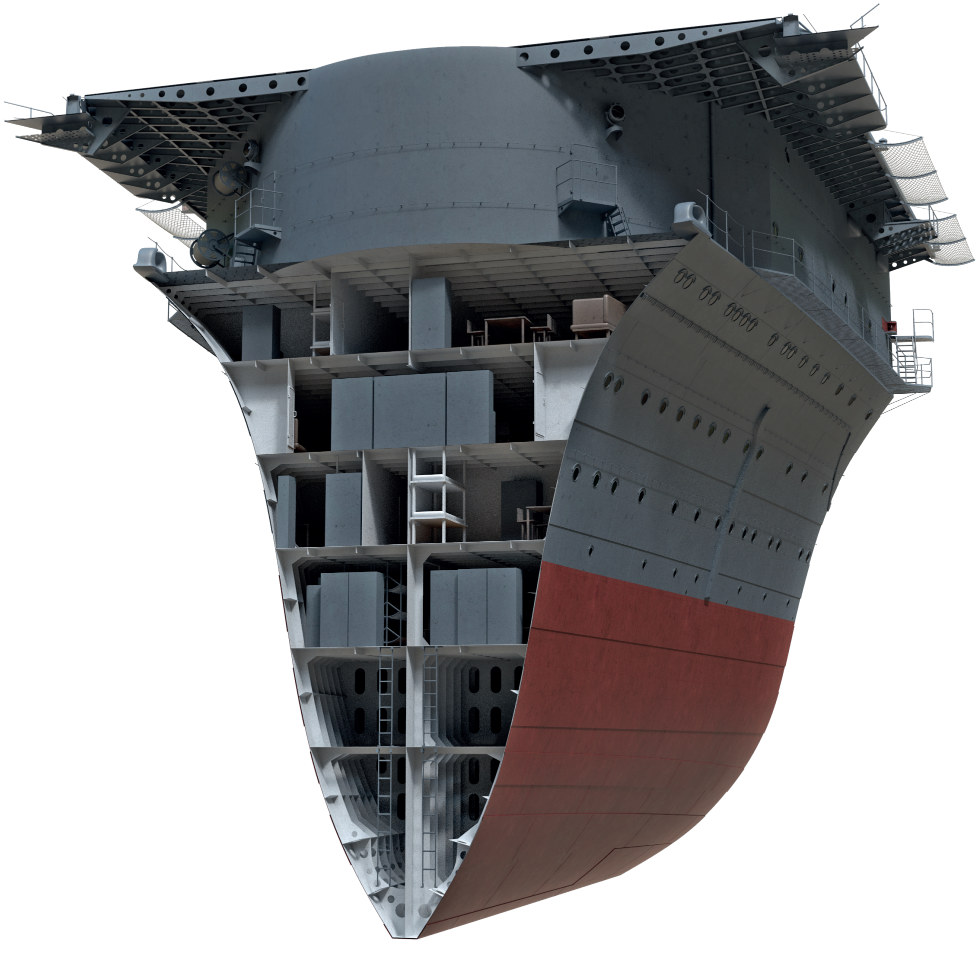


B3/1





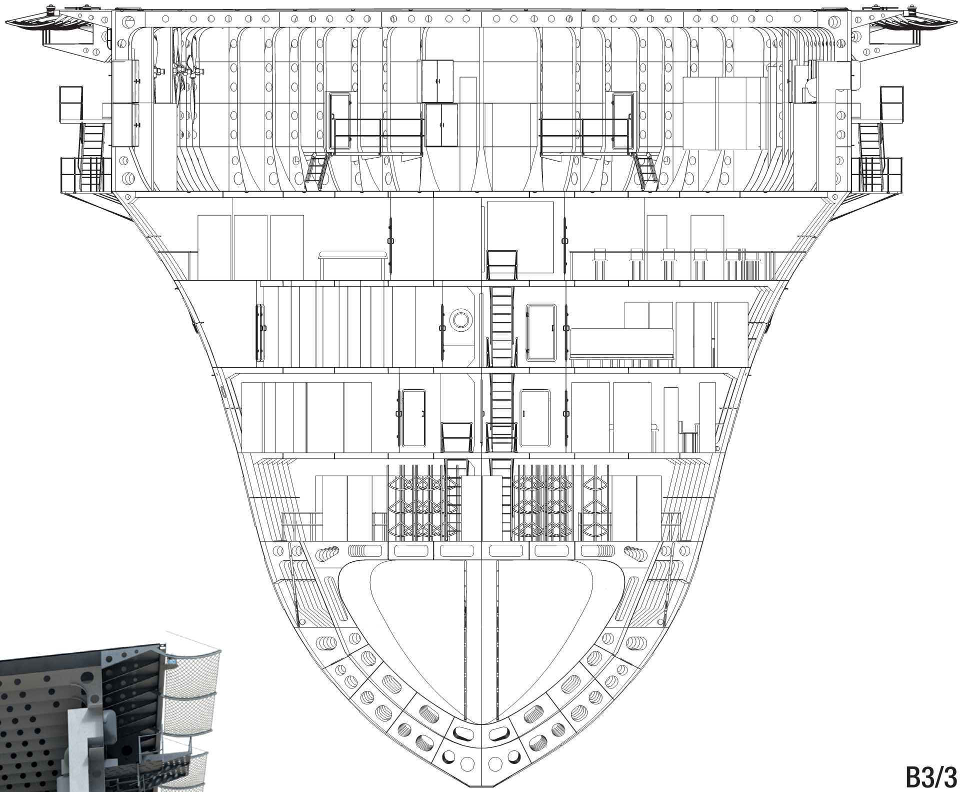
B3/2



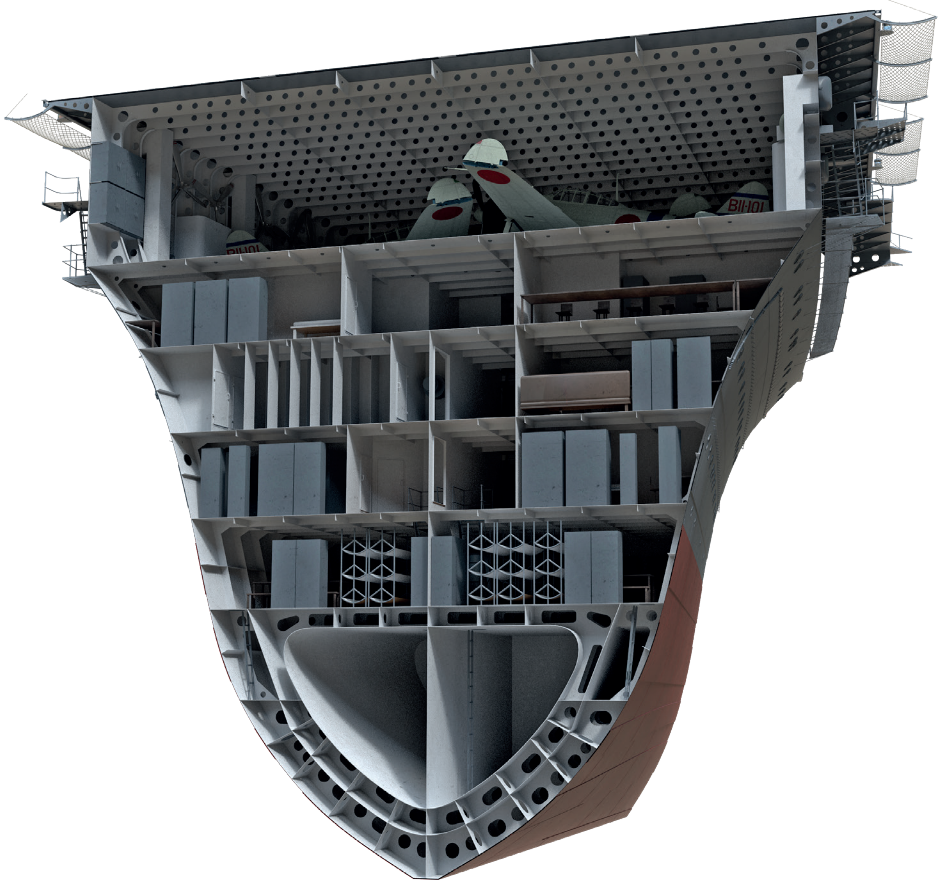
TRANSVERSE SECTIONS (1/200 SCALE)

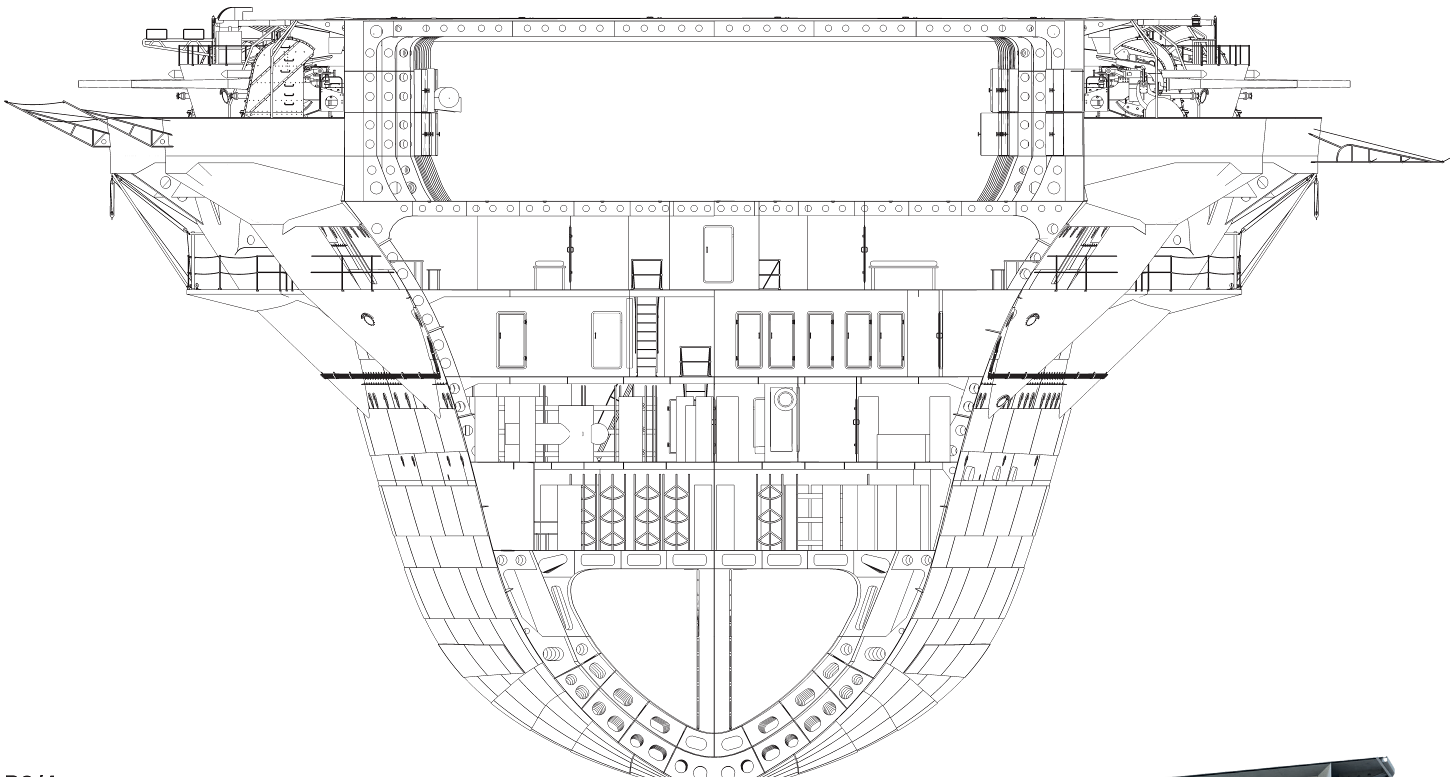
B3/3 FRAME 64 LOOKING FORWARD

B3/4 FRAME 64 LOOKING AFT

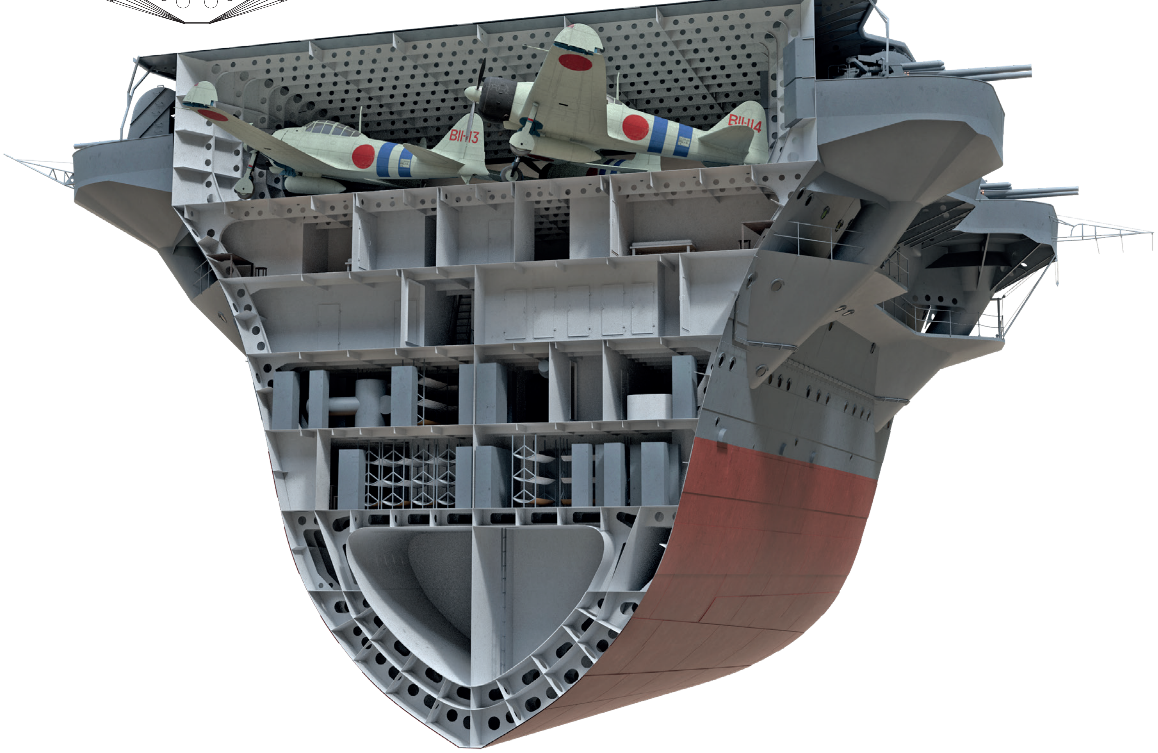


B3/3





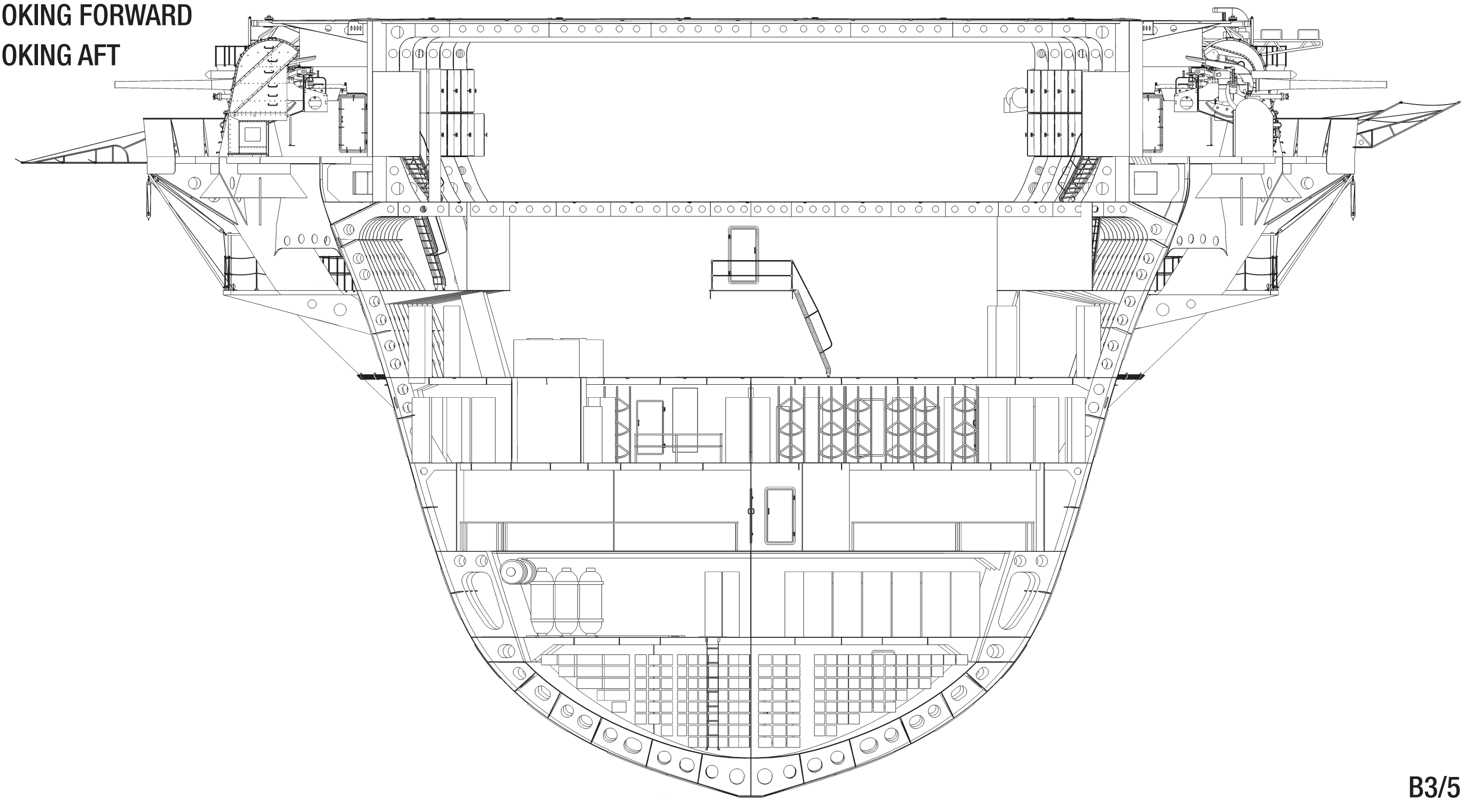
B3/4


BI-113
BI-114

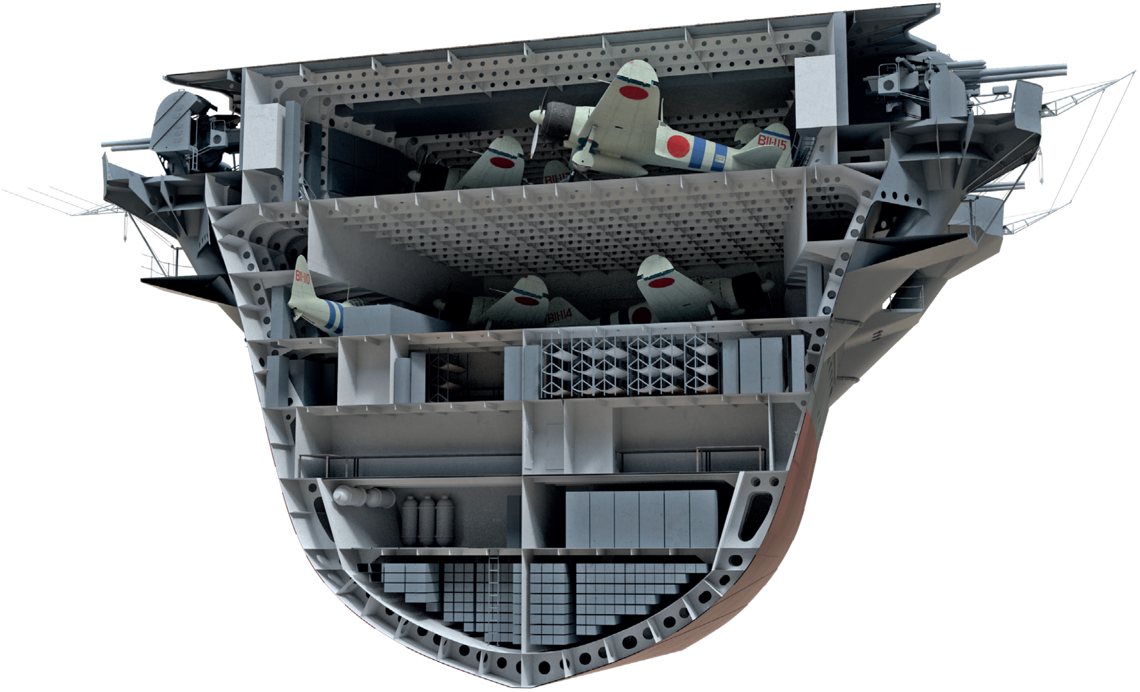
TRANSVERSE SECTIONS (1/200 SCALE)

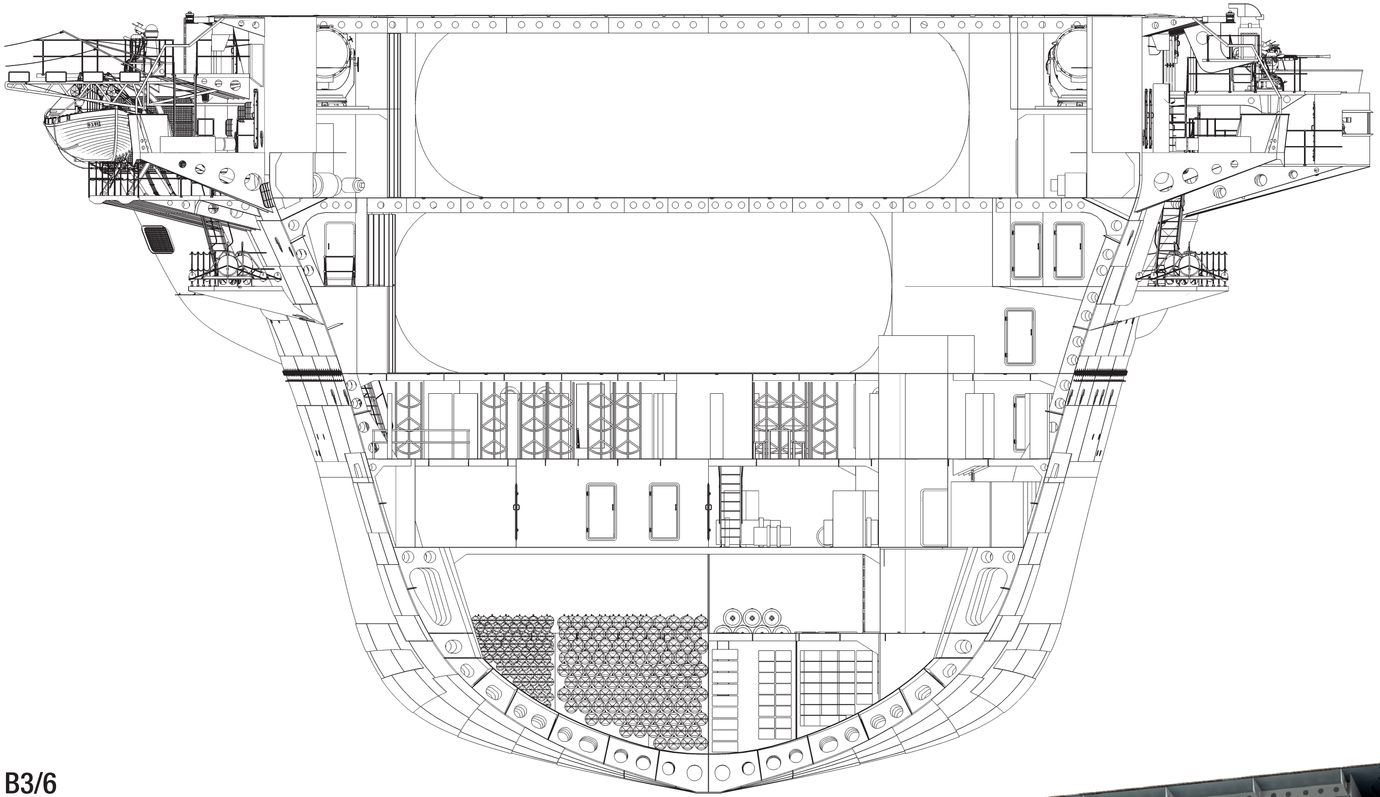
B3/5 FRAME 84 LOOKING FORWARD

B3/6 FRAME 84 LOOKING AFT

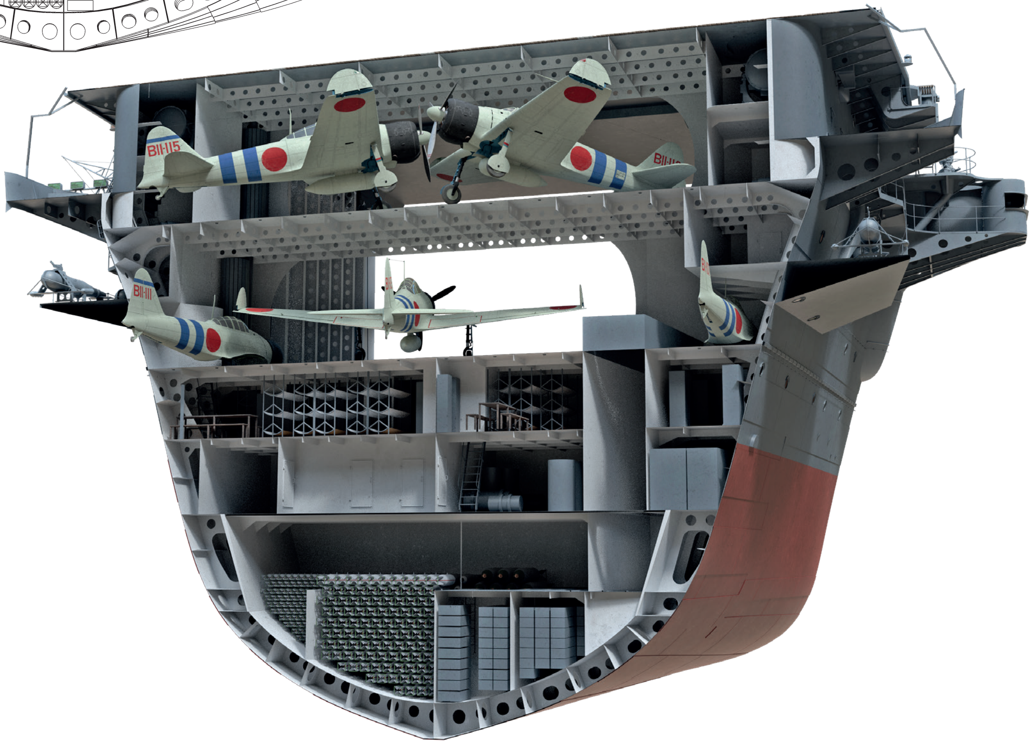


B3/5



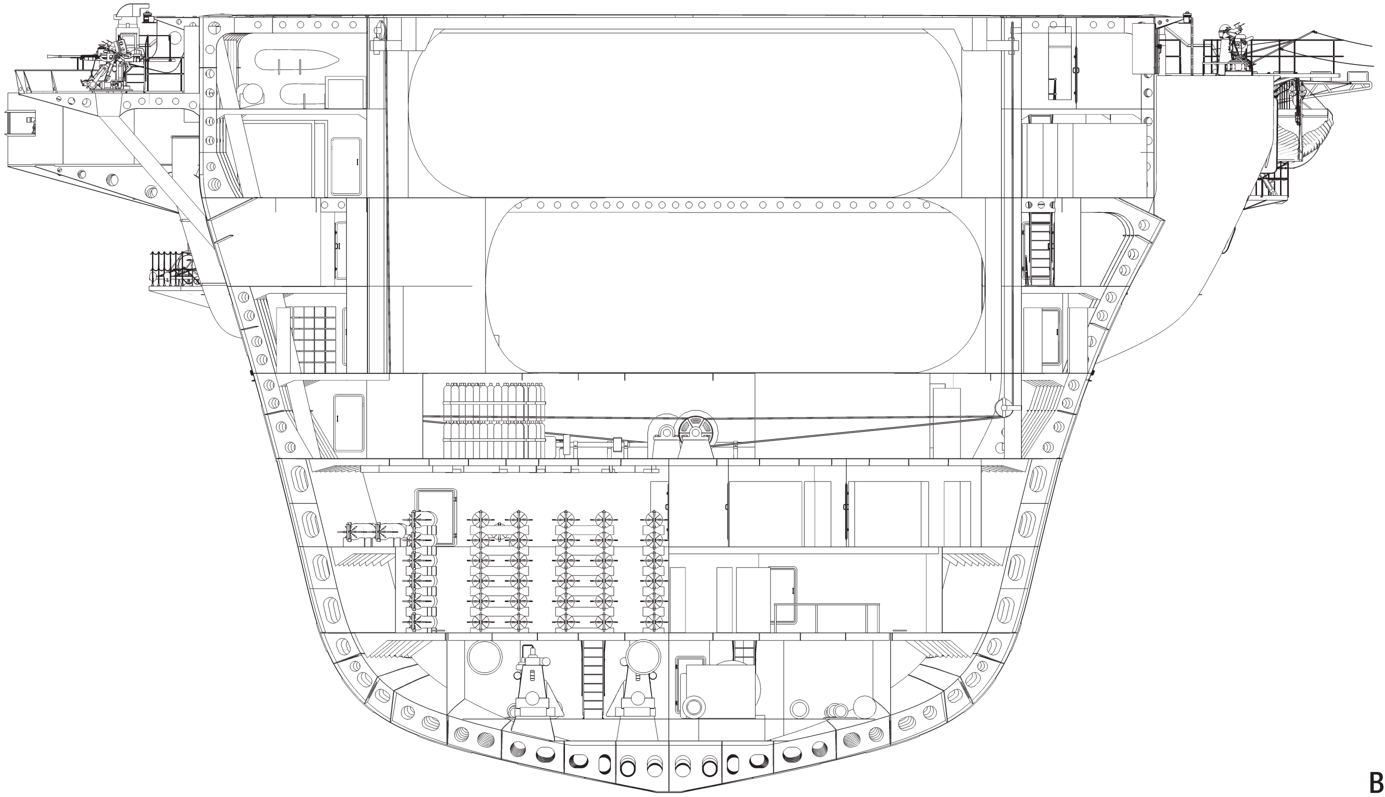


B3/6

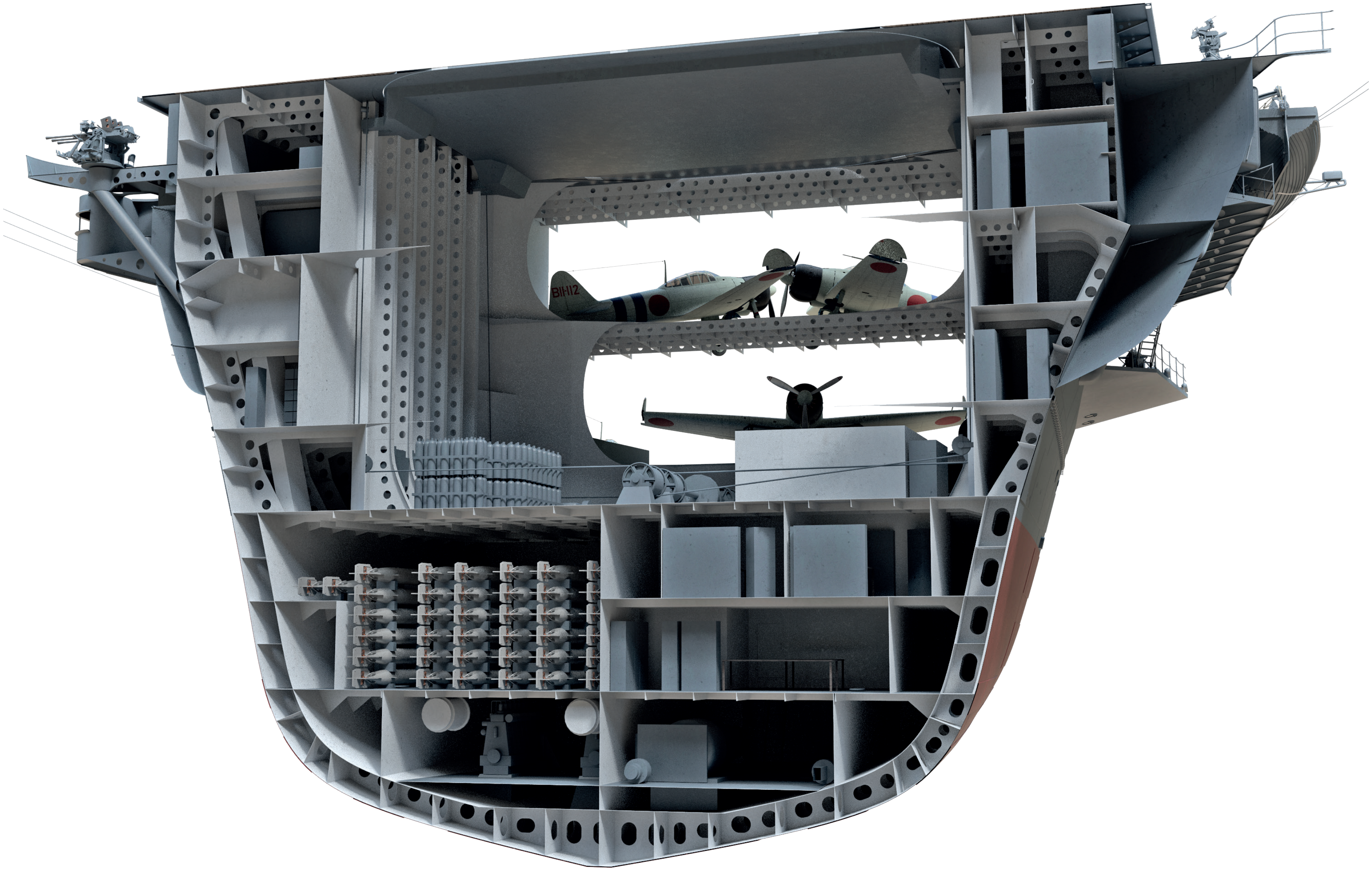

BII-115
BII-111

TRANSVERSE SECTIONS (1/200 SCALE)

B3/7 FRAME 99 LOOKING FORWARD

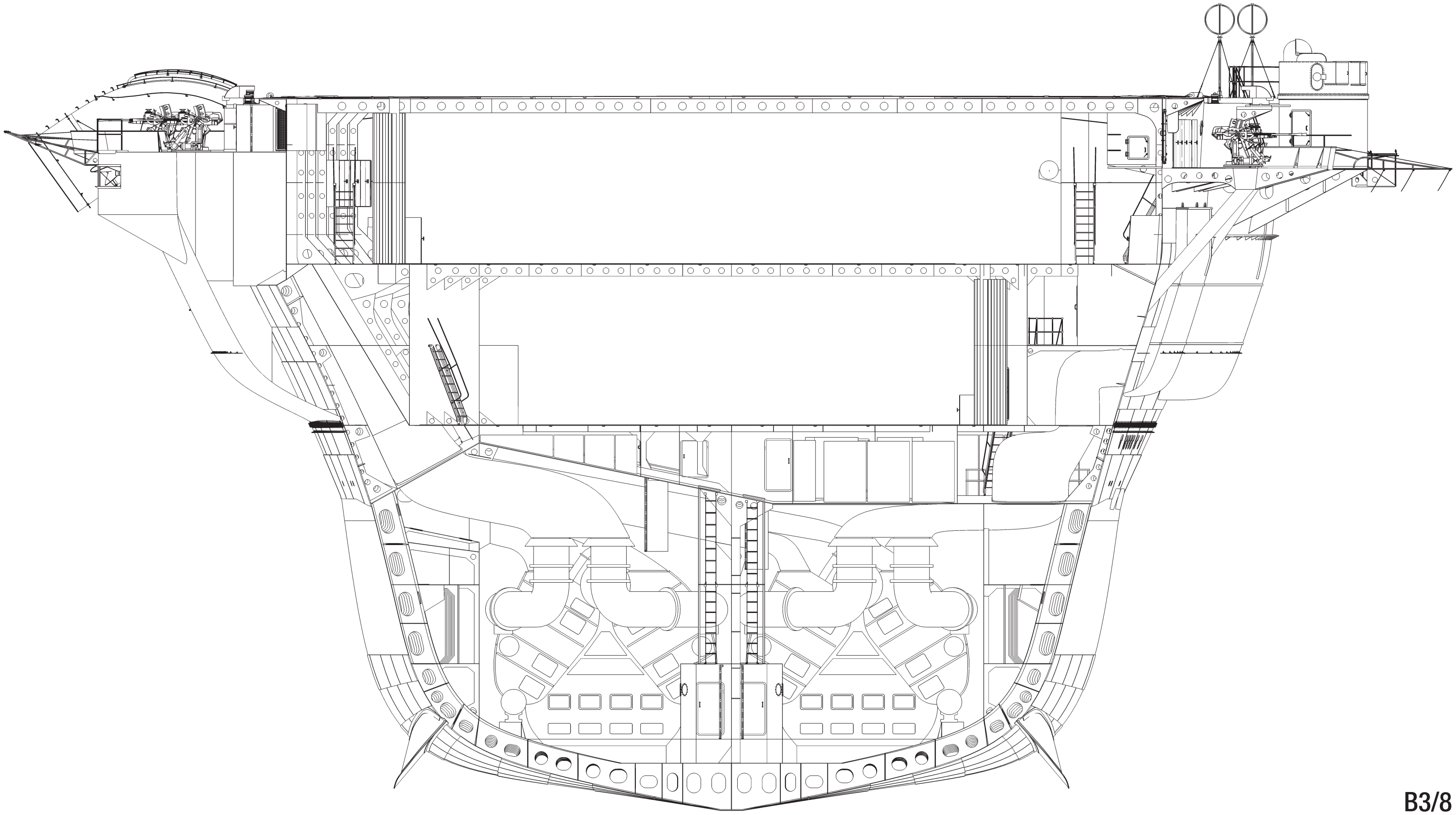


B3/7

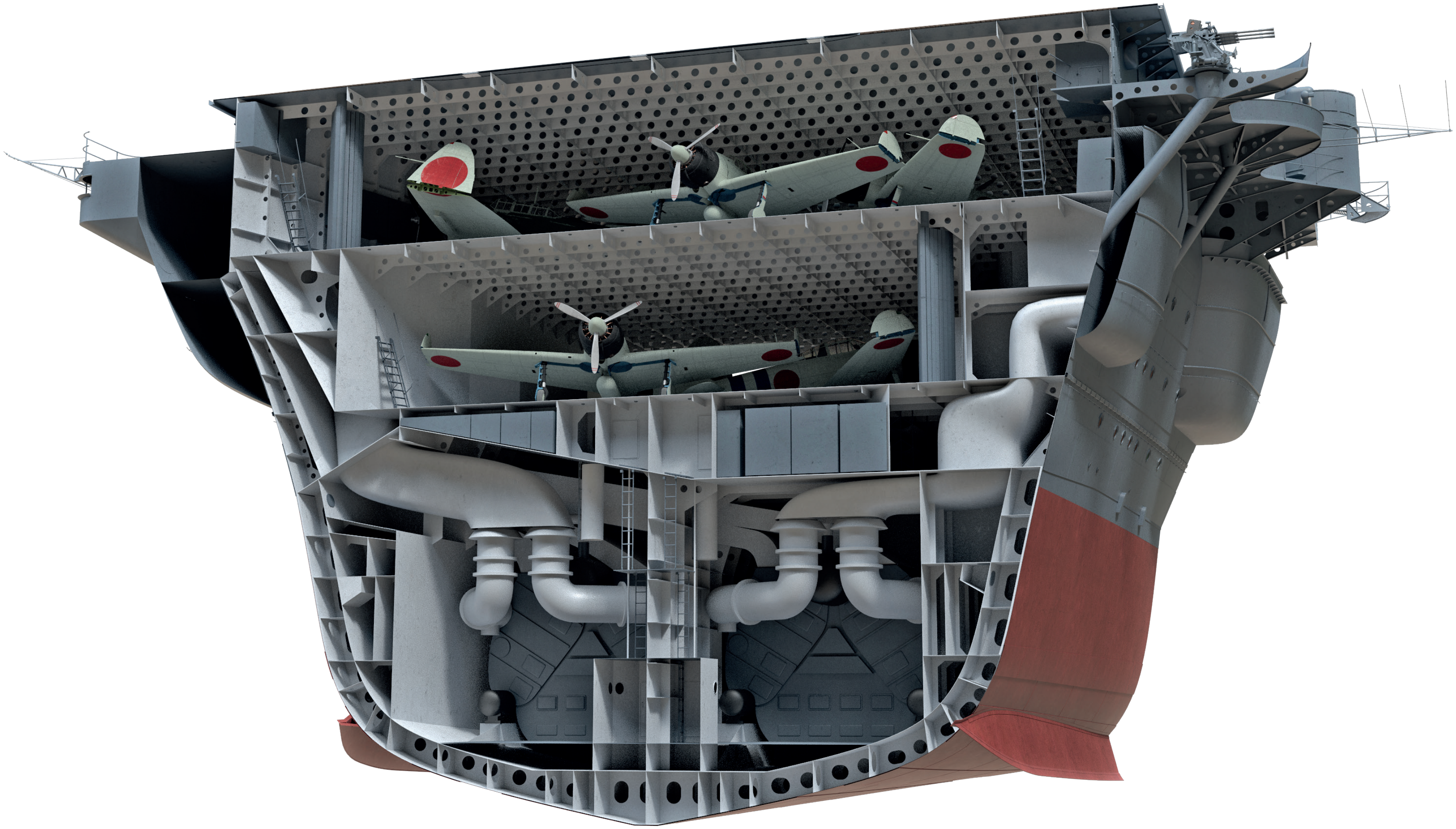

BII-112

TRANSVERSE SECTIONS (1/200 SCALE)

B3/8 FRAME 99 LOOKING AFT

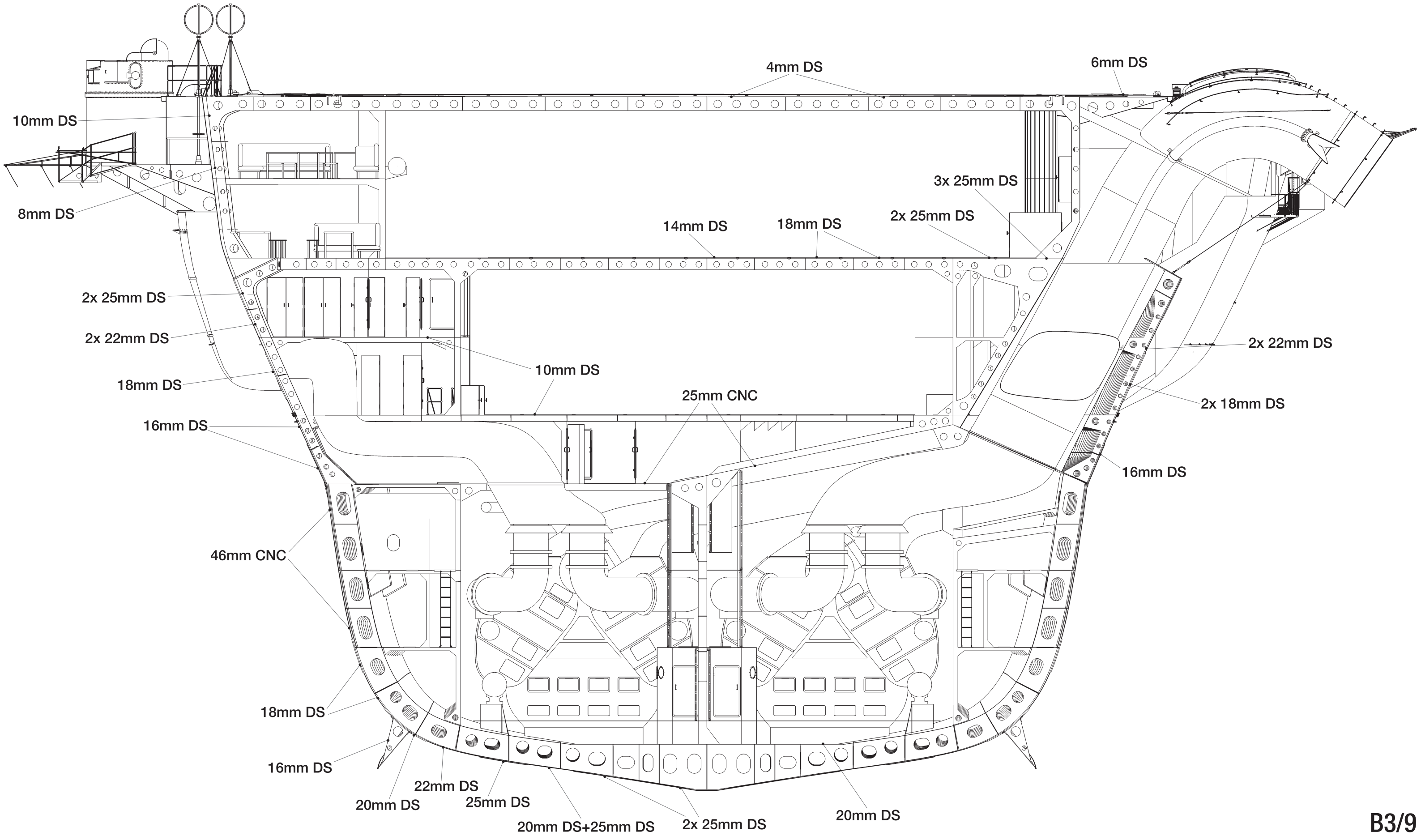


B3/8



TRANSVERSE SECTIONS (1/200 SCALE)

B3/9 FRAME 117 LOOKING FORWARD WITH PLATING THICKNESSES INDICATED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22mm DS
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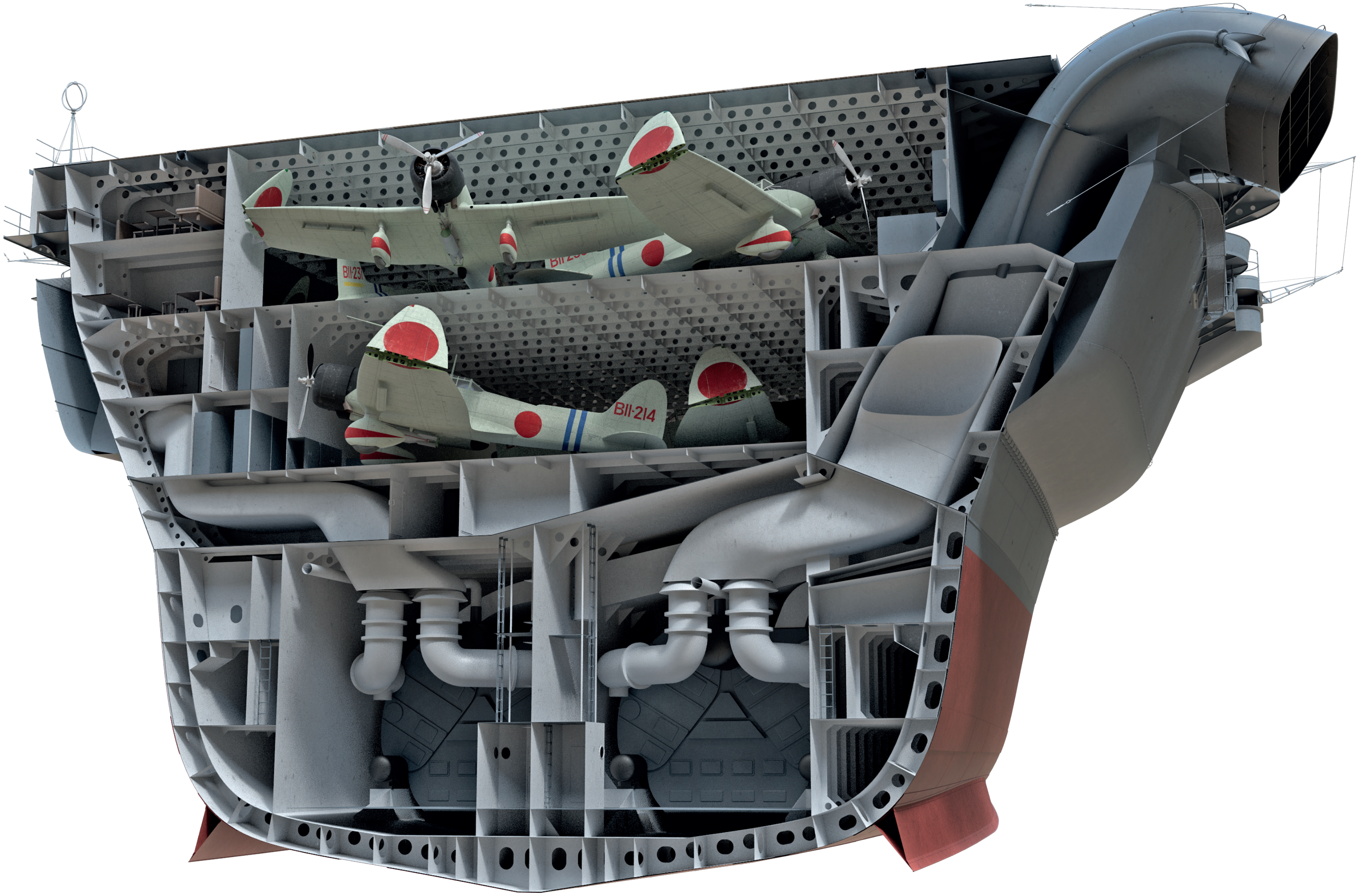
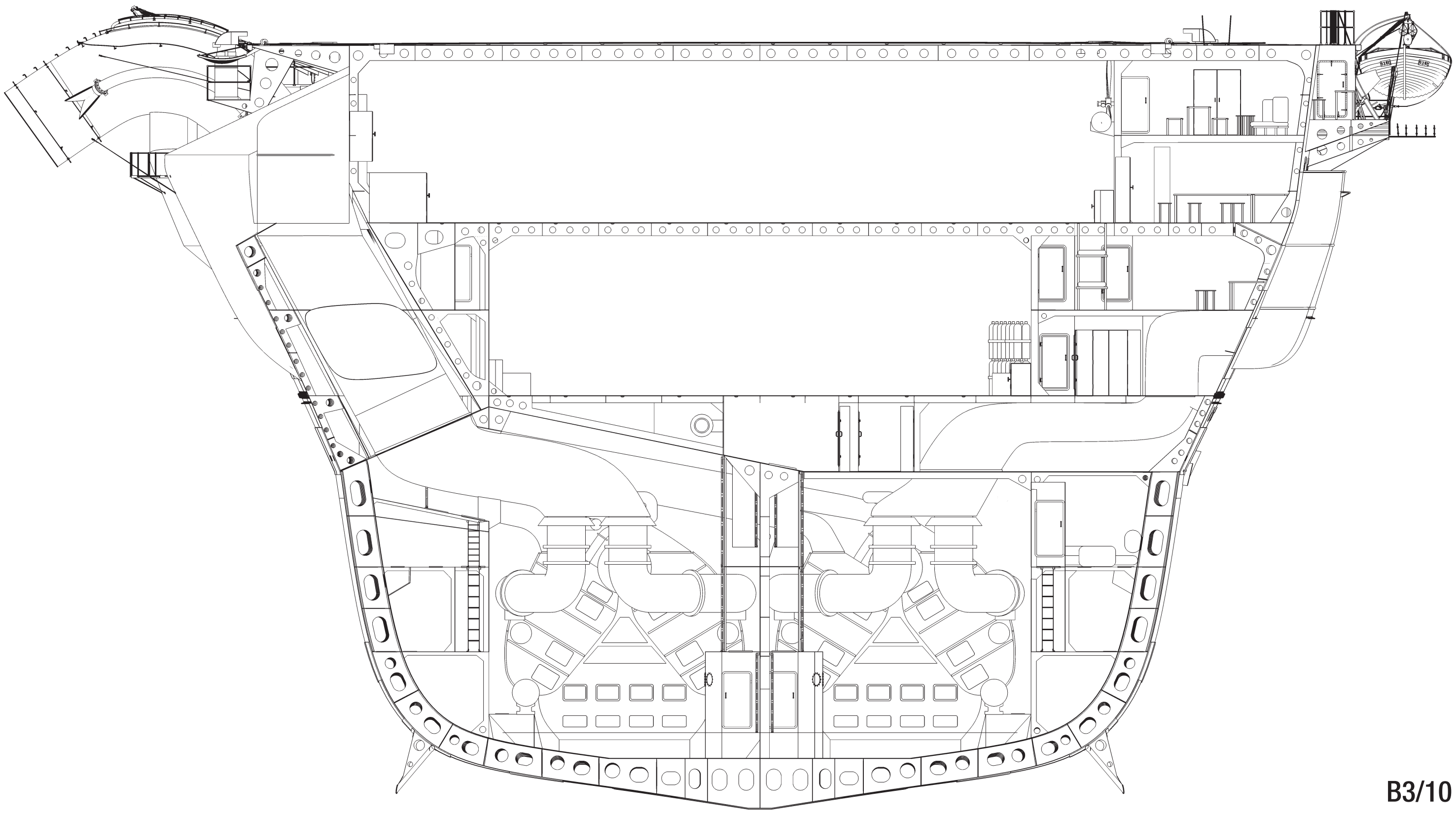
2x 25mm DS
20mm DS

B3/9

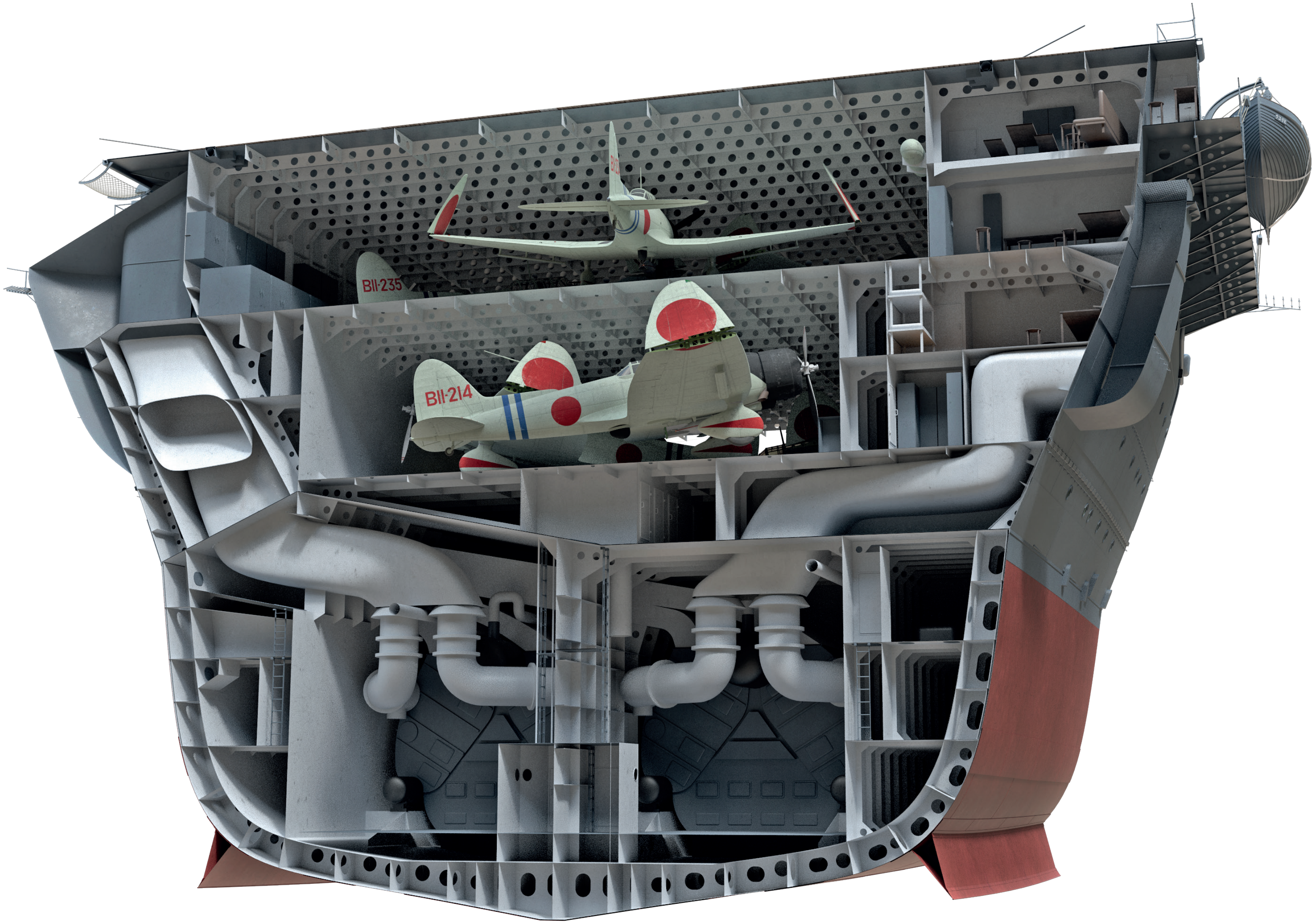

BII-214

TRANSVERSE SECTIONS (1/200 SCALE)

B3/10 FRAME 117 LOOKING AFT

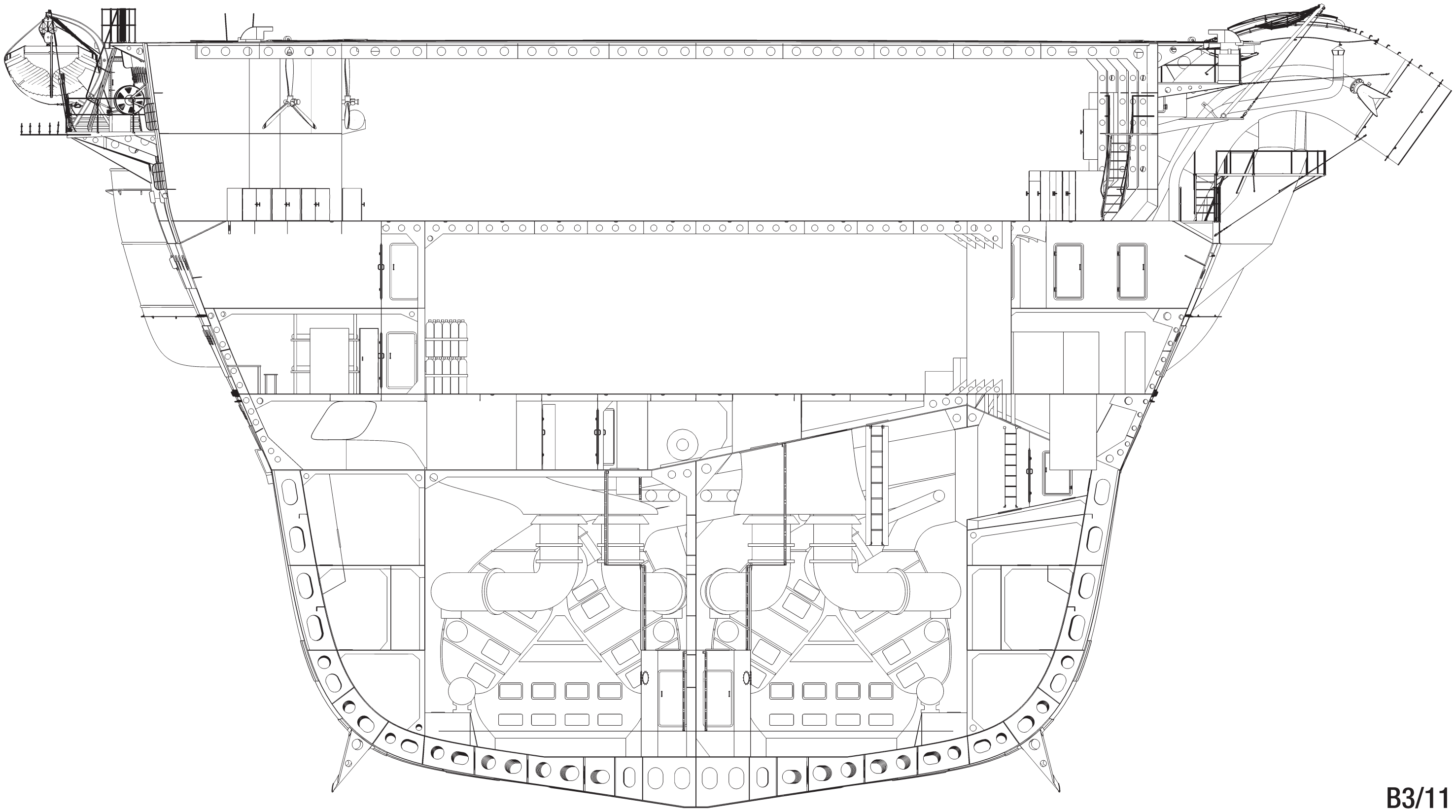


B3/10

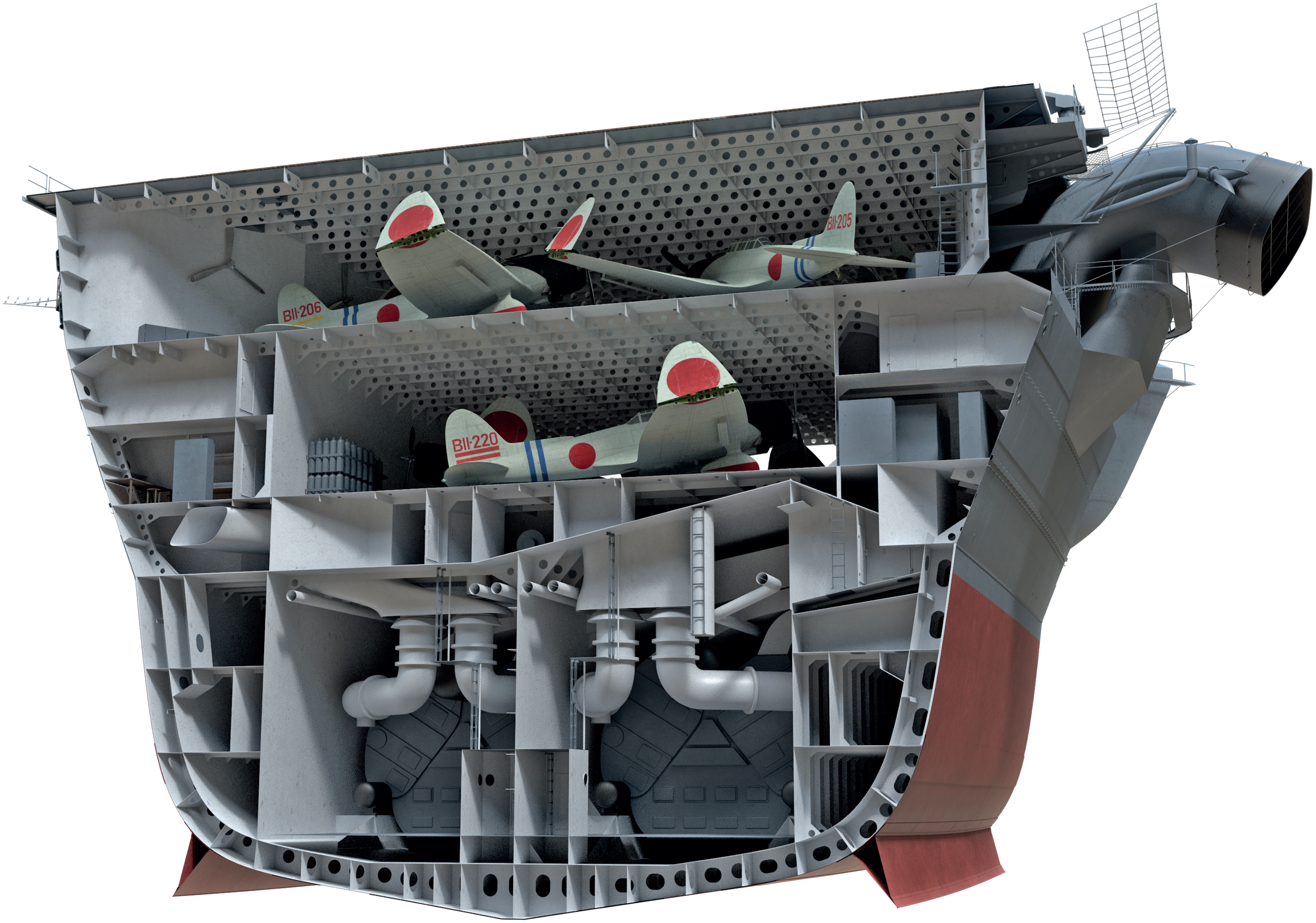

BII-235
BII-214

TRANSVERSE SECTIONS (1/200 SCALE)

B3/11 FRAME 135 LOOKING FORWARD

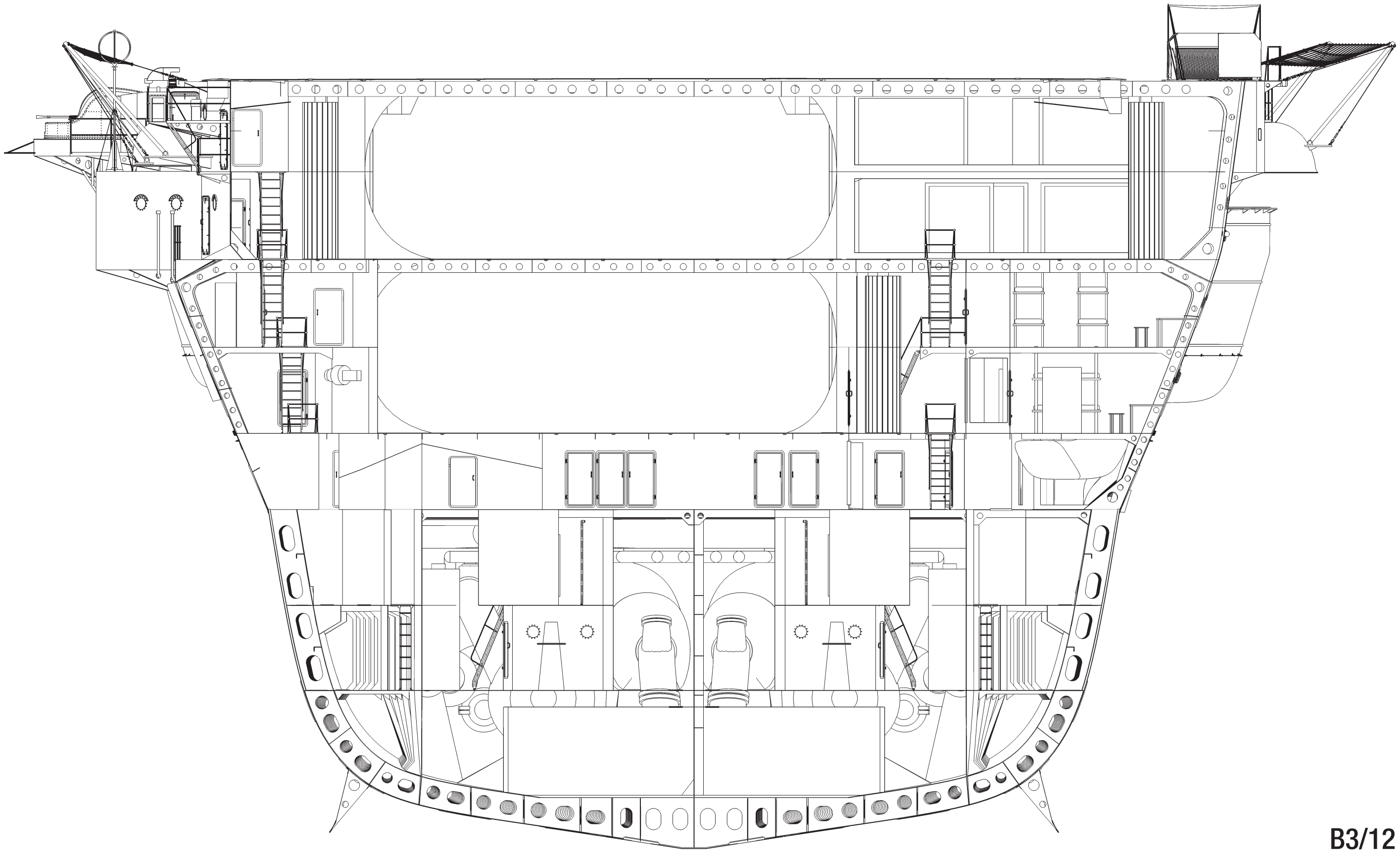


B3/11

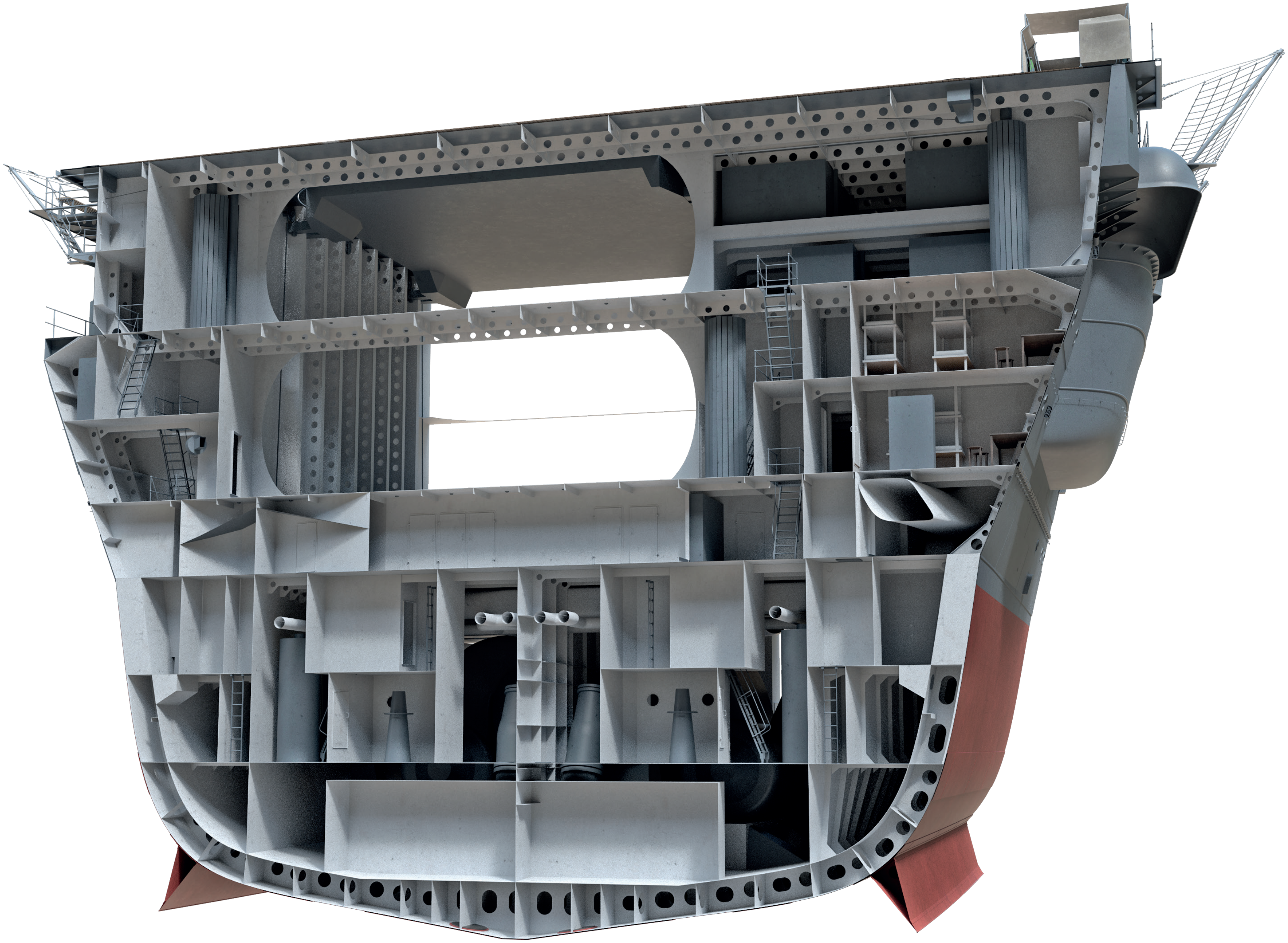

BII-206
BII-205
BII-220

TRANSVERSE SECTIONS (1/200 SCALE)

B3/12 FRAME 135 LOOKING AFT

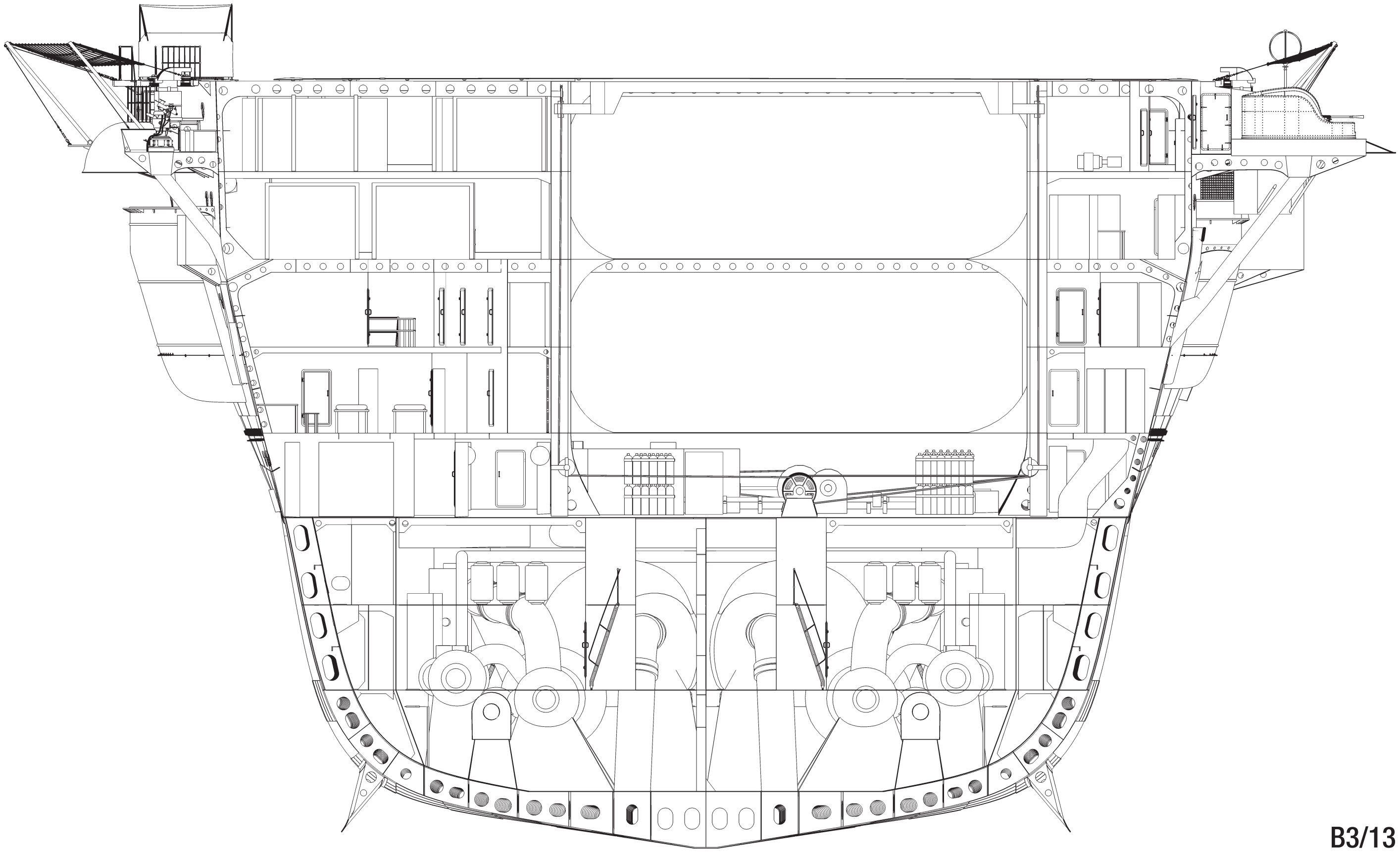


B3/12

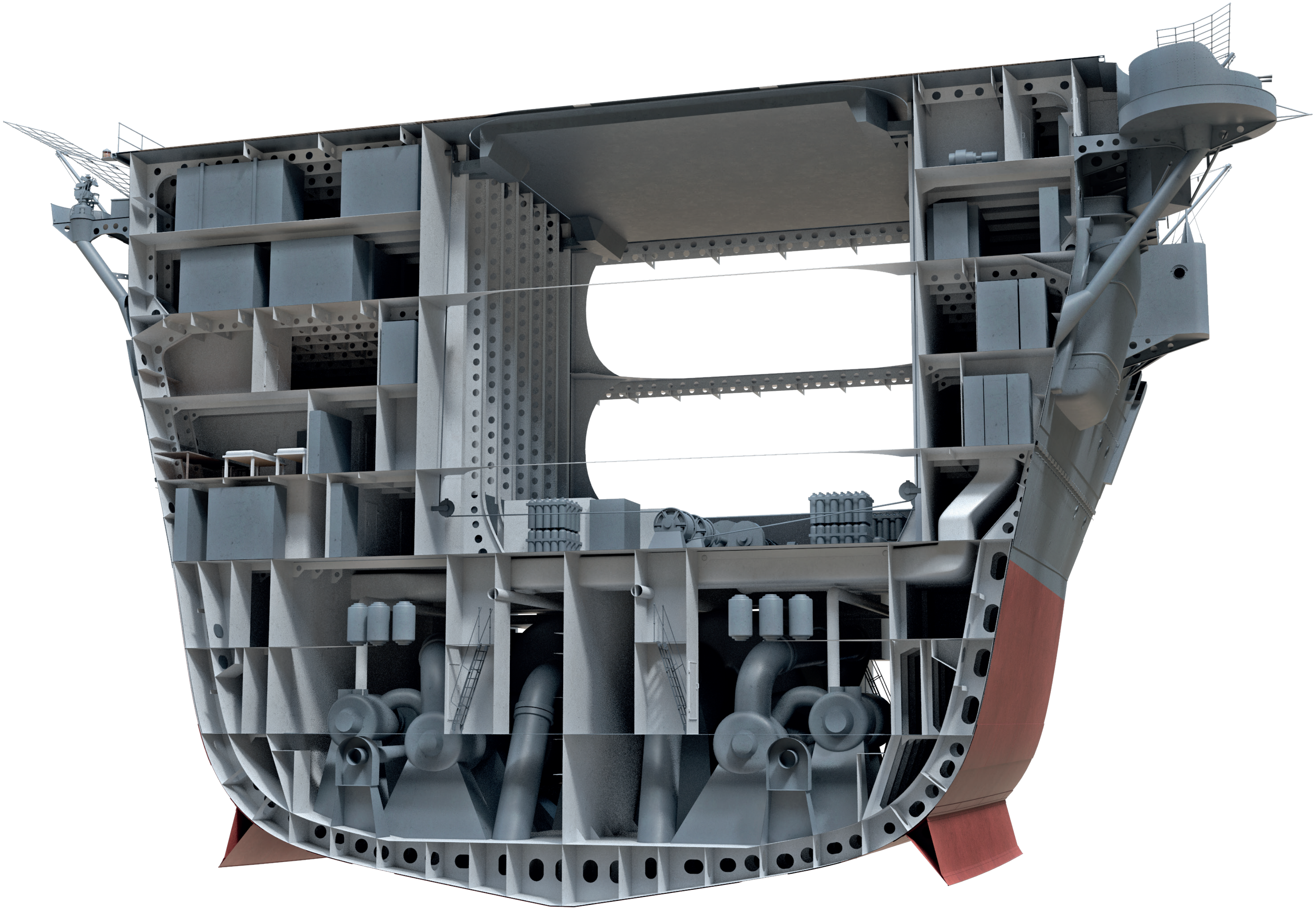


TRANSVERSE SECTIONS (1/200 SCALE)

B3/13 FRAME 149 LOOKING FORWARD

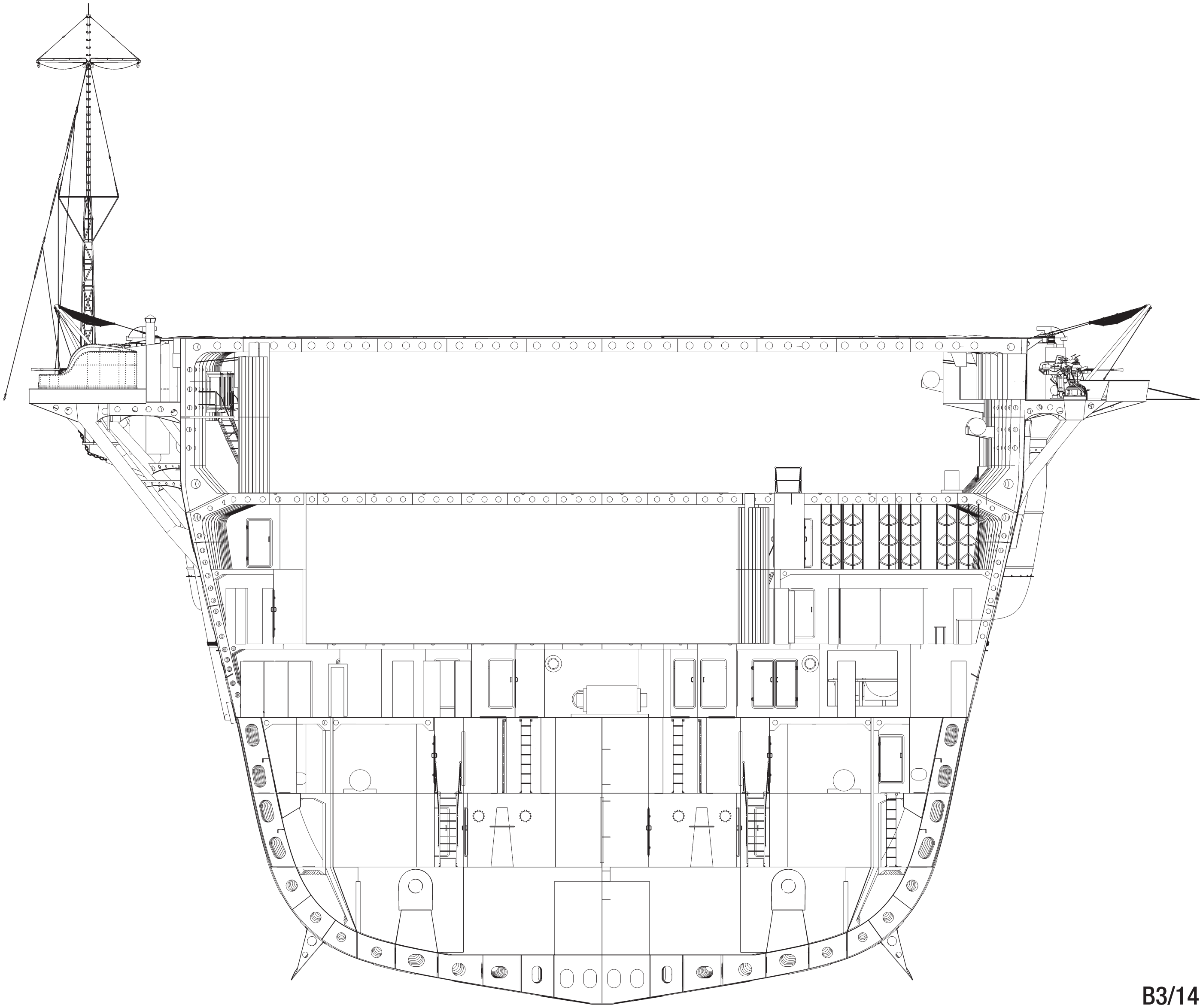


B3/13

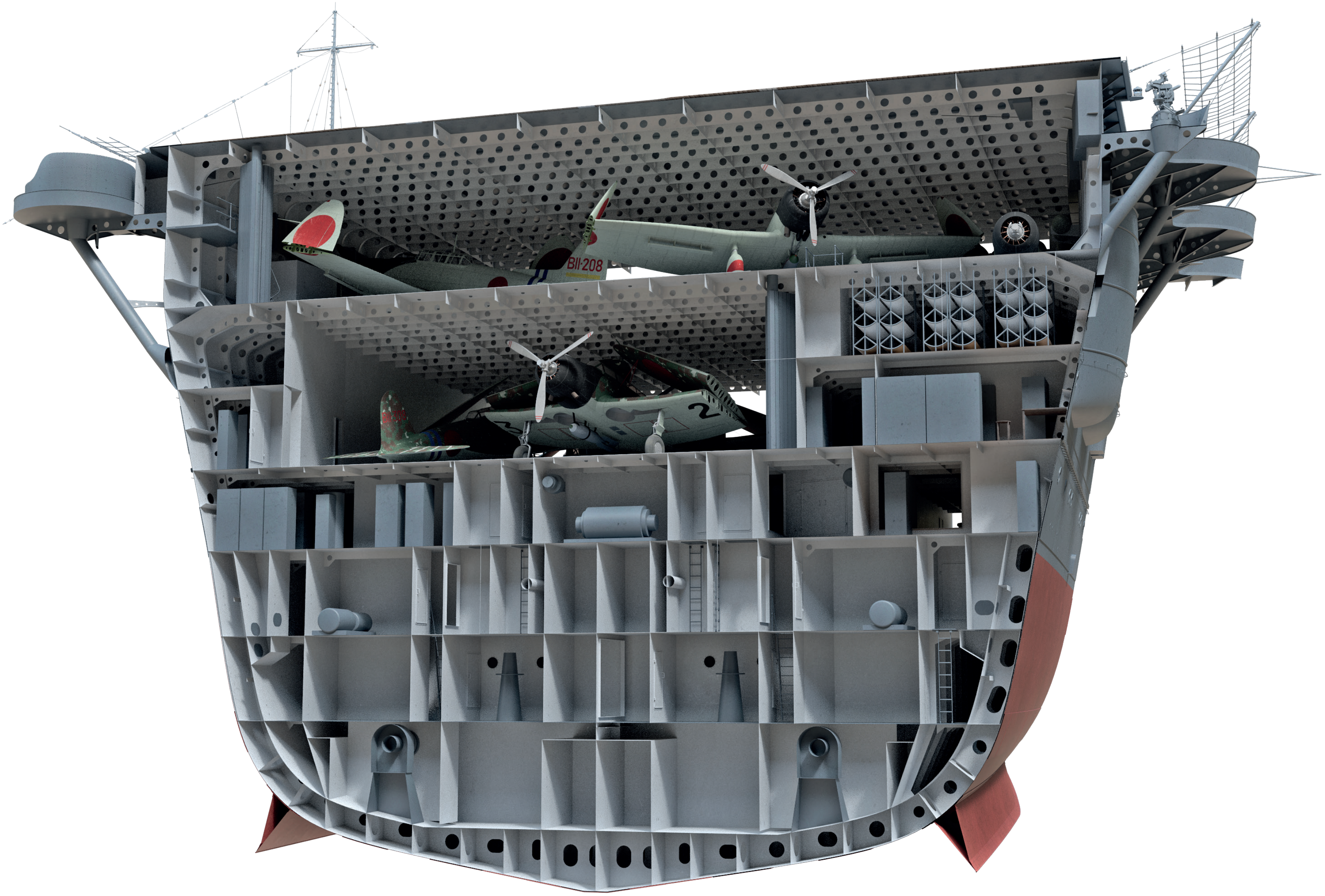


TRANSVERSE SECTIONS (1/200 SCALE)

B3/14 FRAME 149 LOOKING AFT



B3/14


BII-208
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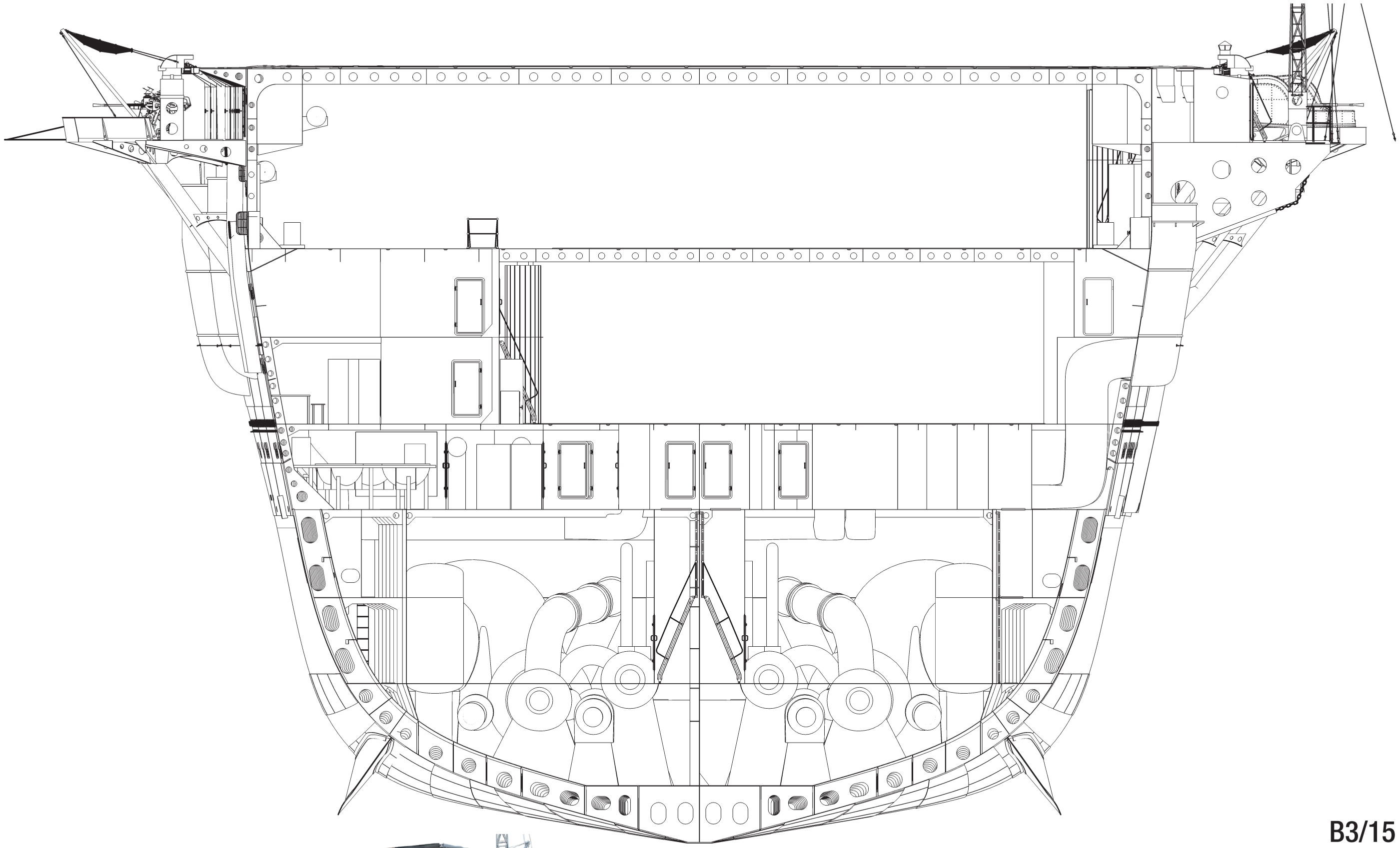
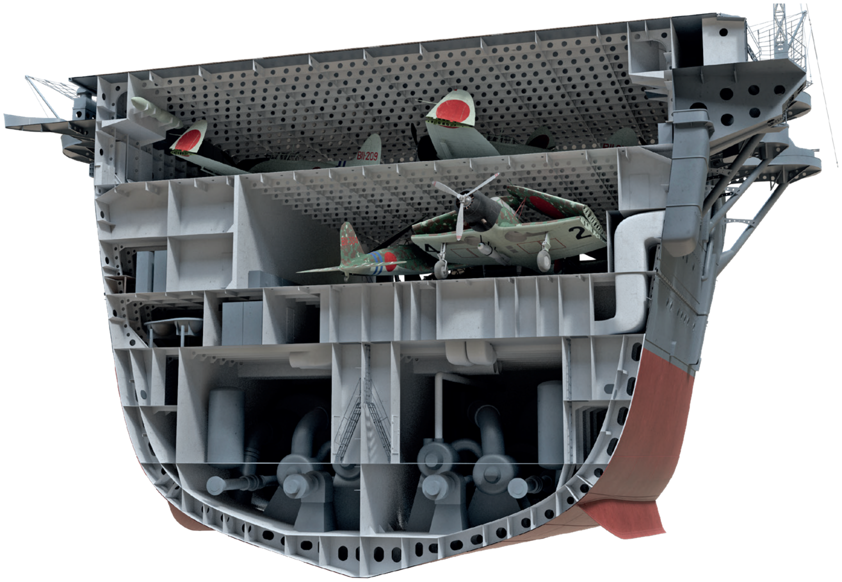
TRANSVERSE SECTIONS (1/200 SCALE)

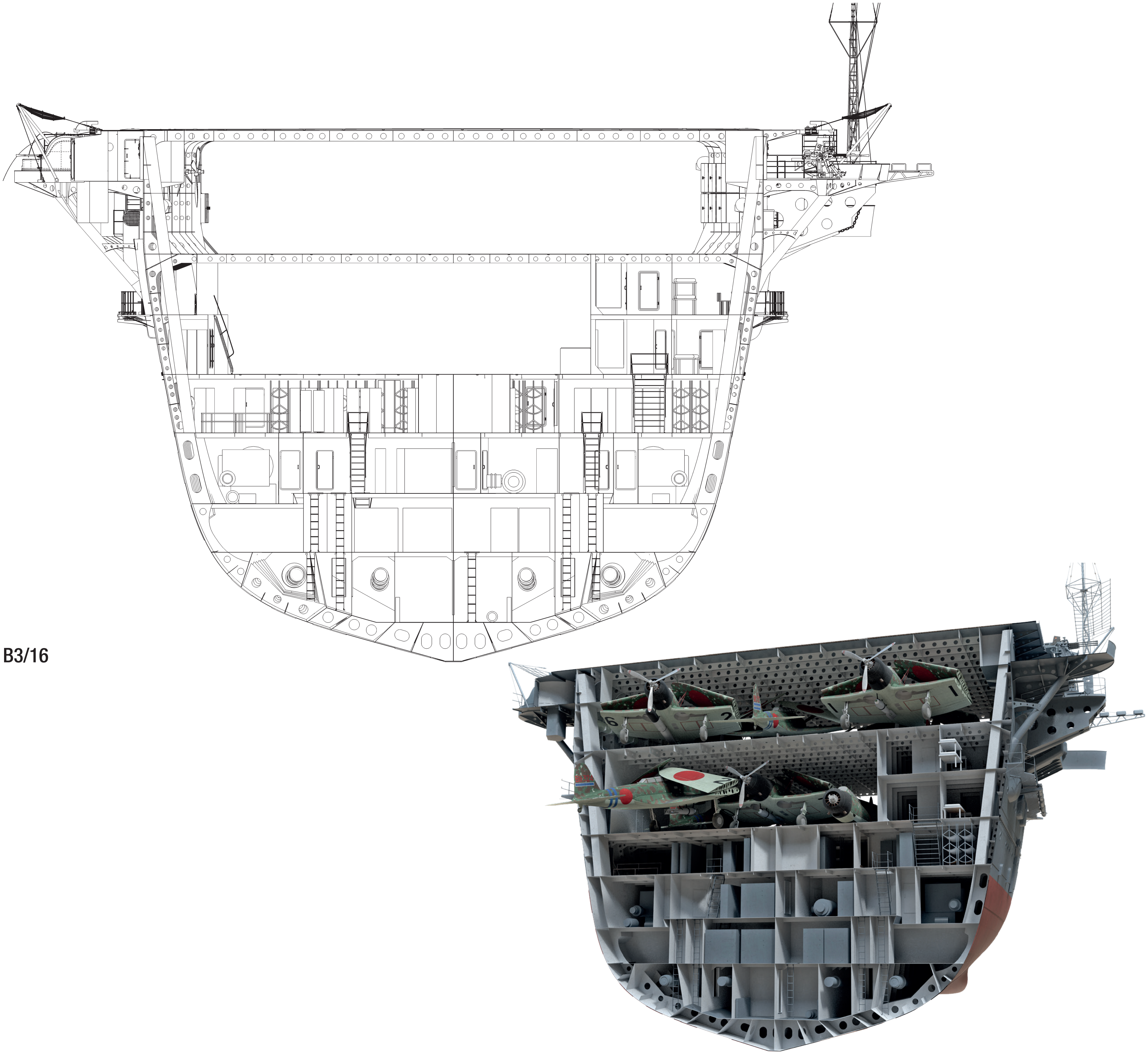
B3/15 FRAME 165 LOOKING FORWARD

B3/16 FRAME 165 LOOKING AFT



B3/15



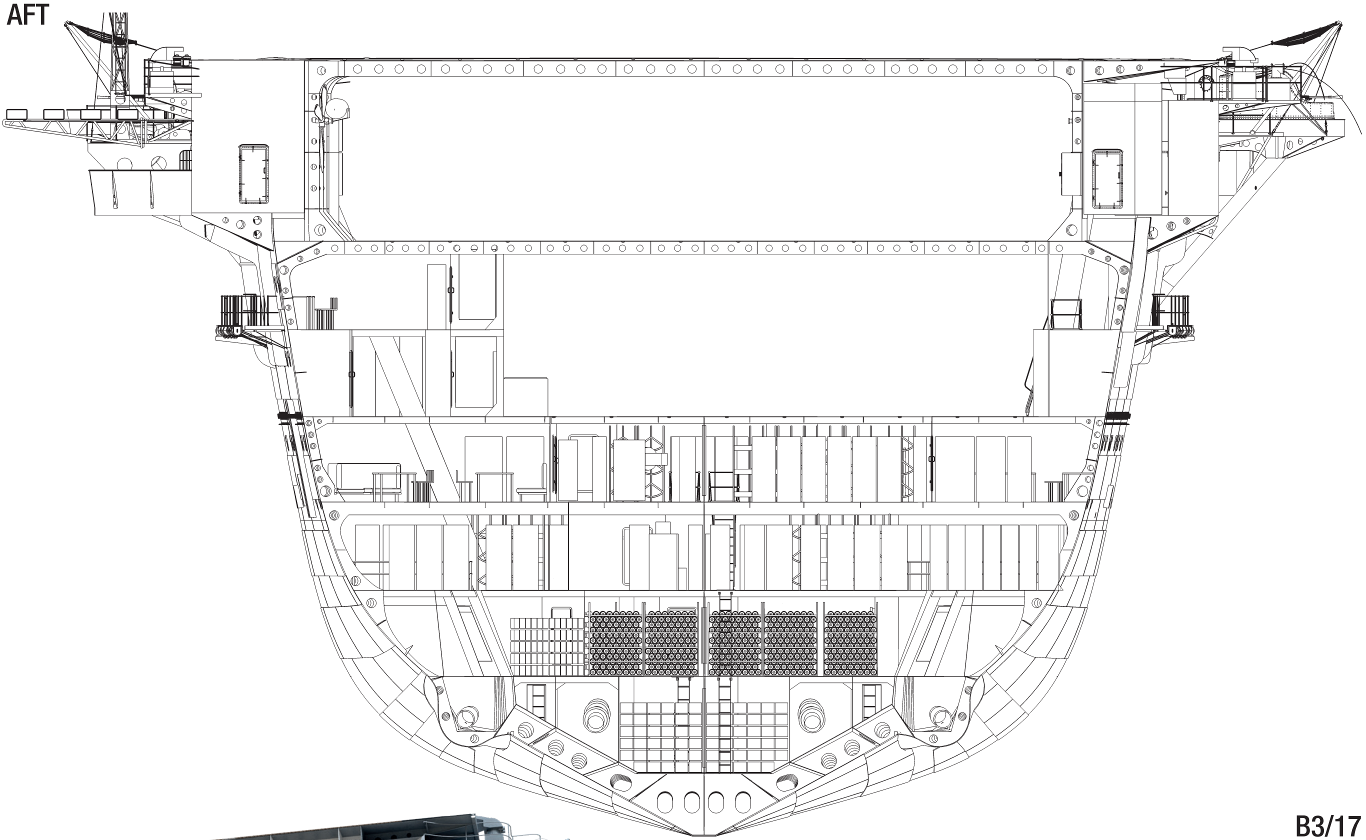


B3/16

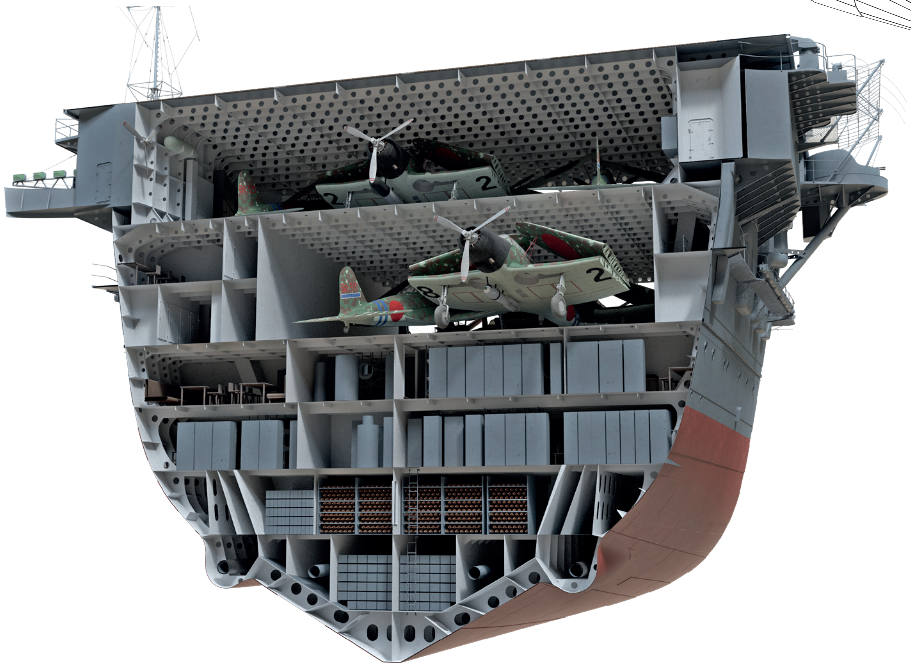
TRANSVERSE SECTIONS (1/200 SCALE)

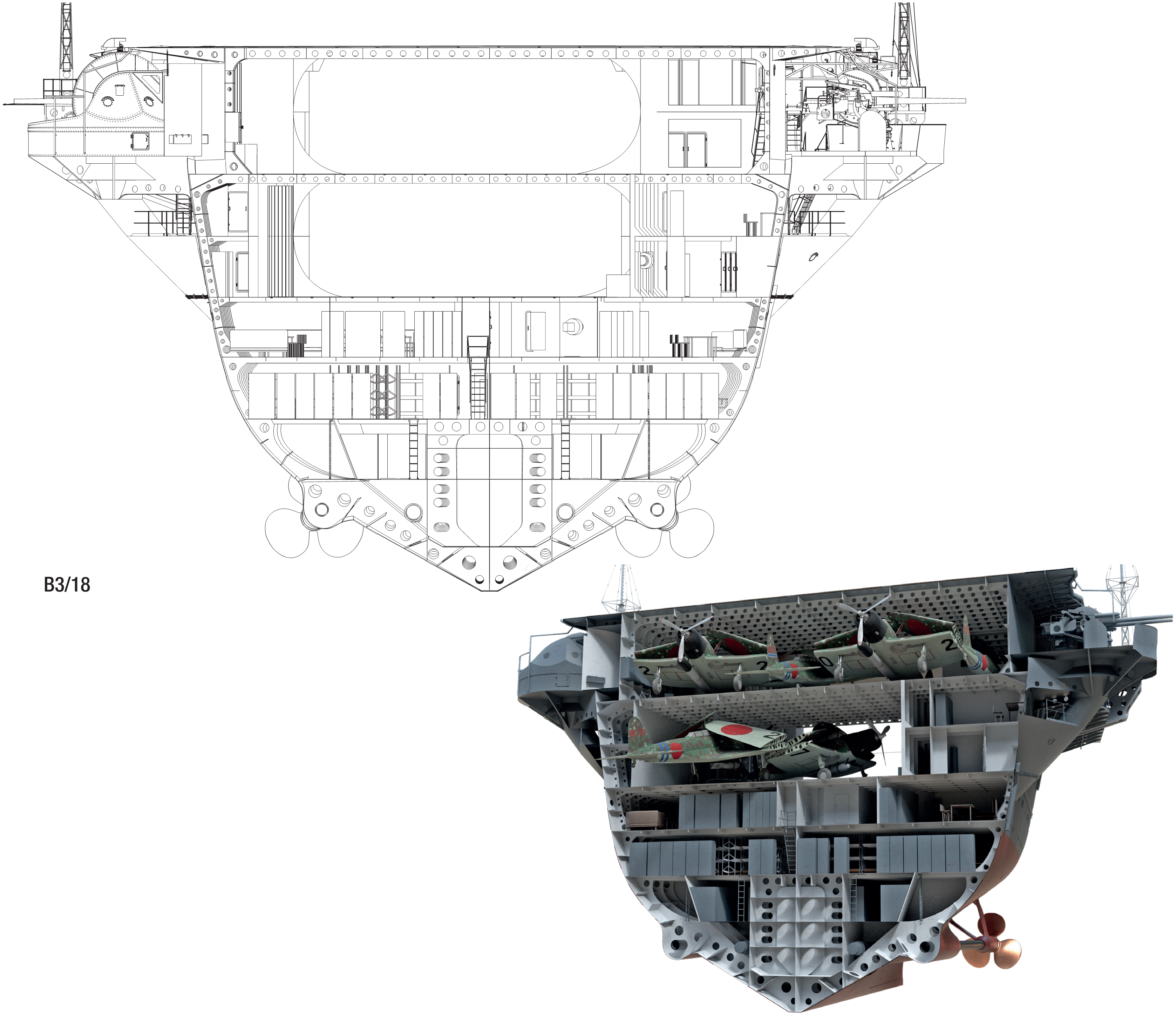
B3/17 FRAME 181 LOOKING FORWARD

B3/18 FRAME 181 LOOKING AFT



B3/17



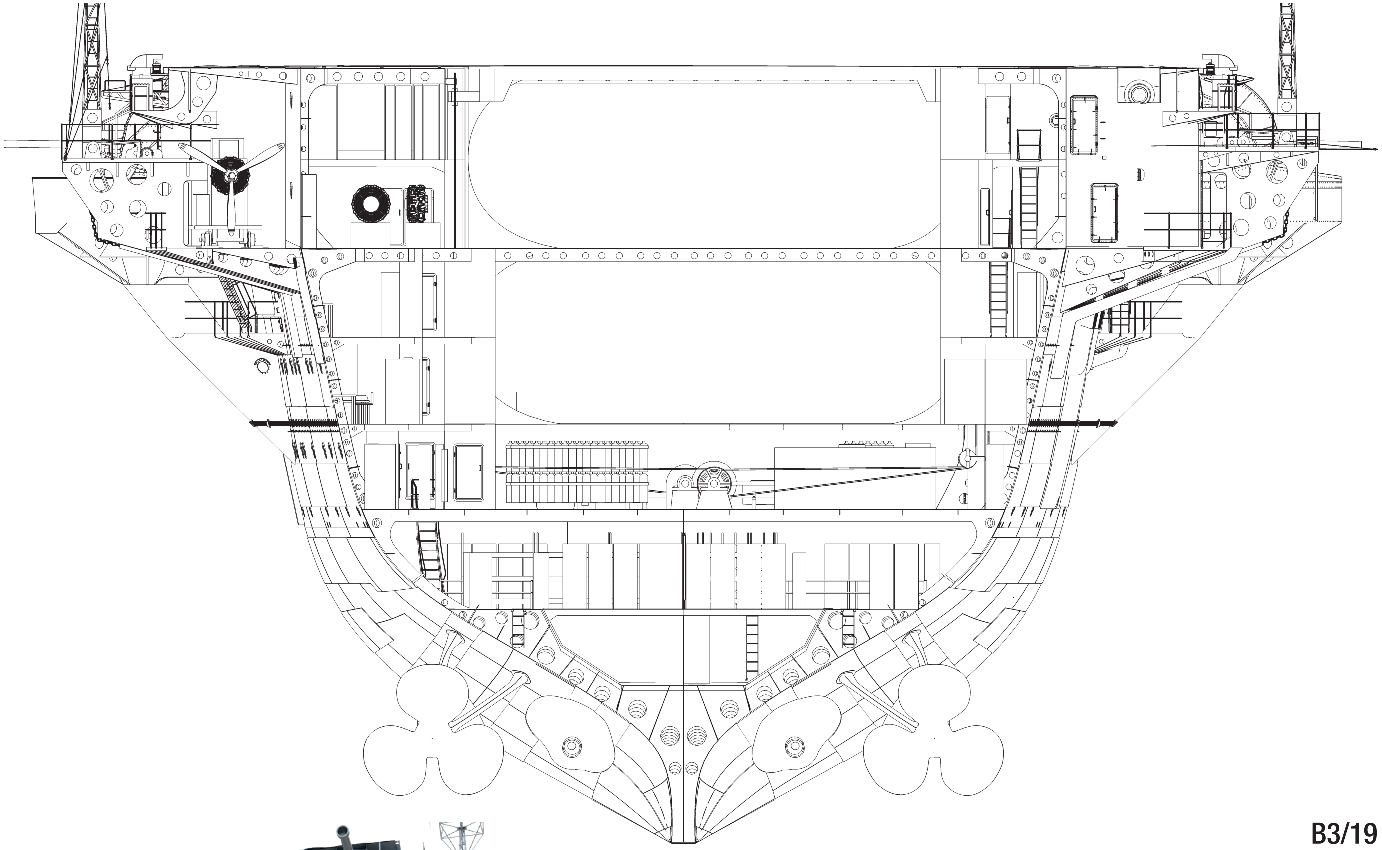


B3/18

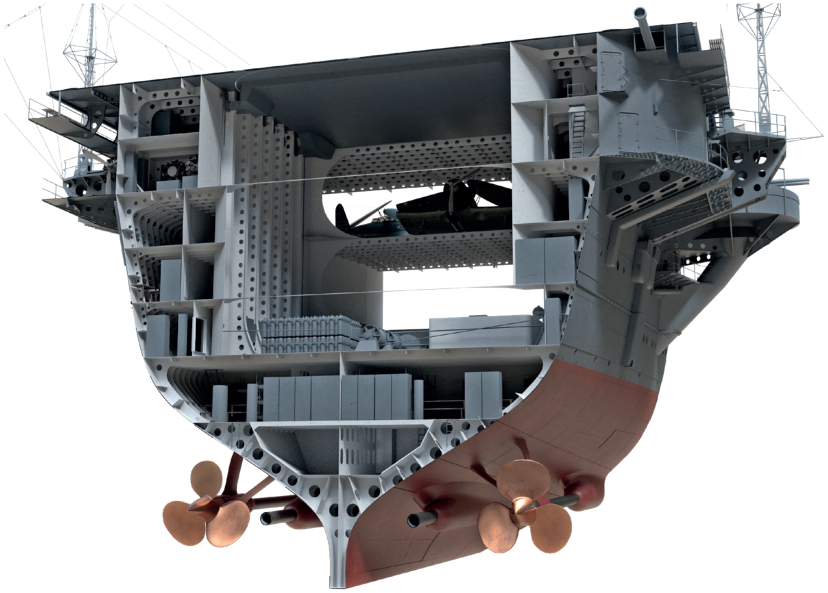
TRANSVERSE SECTIONS (1/200 SCALE)

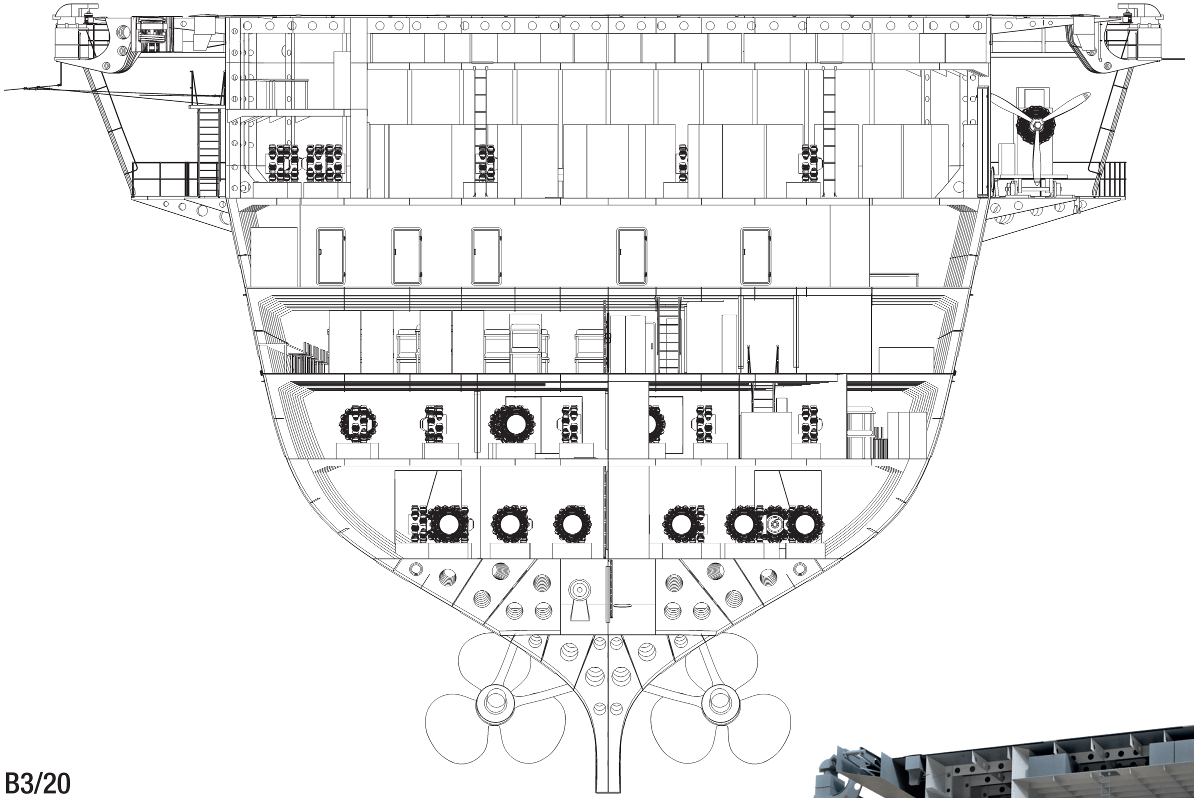
B3/19 FRAME 211 LOOKING FORWARD

B3/20 FRAME 211 LOOKING AFT



B3/19





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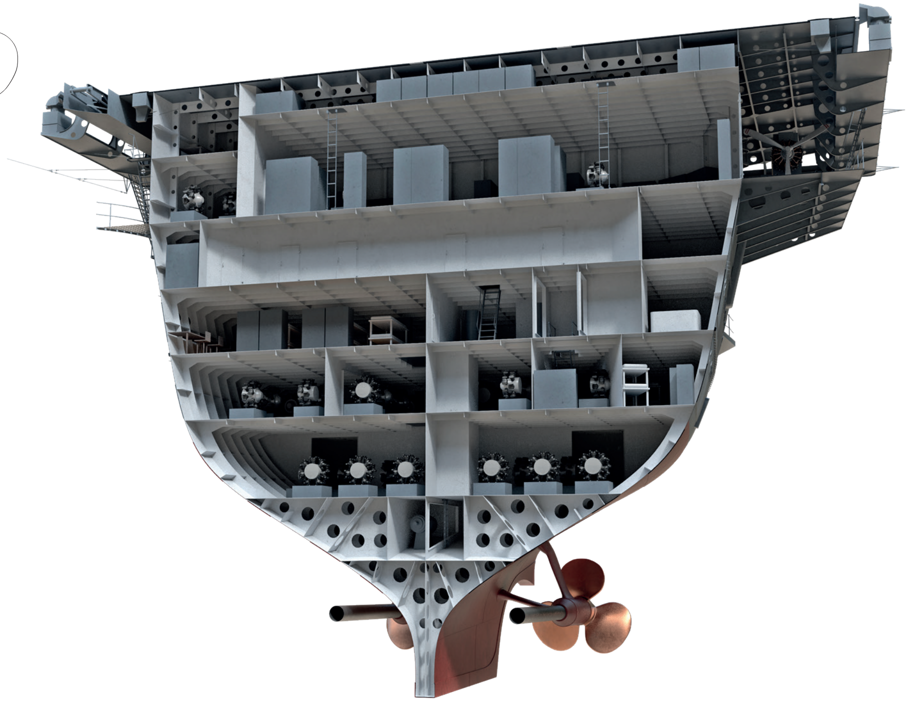
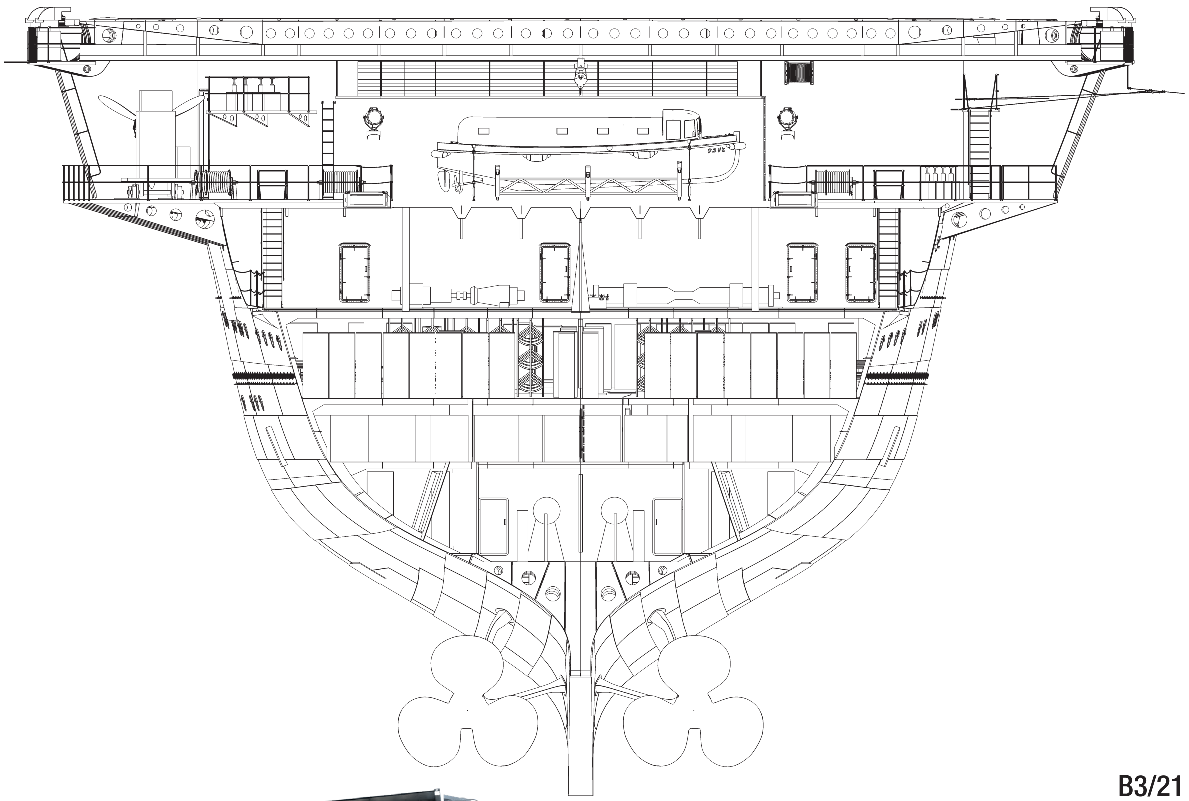


TRANSVERSE SECTIONS (1/200 SCALE)
B3/21 FRAME 211 LOOKING FORWARD
B3/22 FRAME 211 LOOKING AFT



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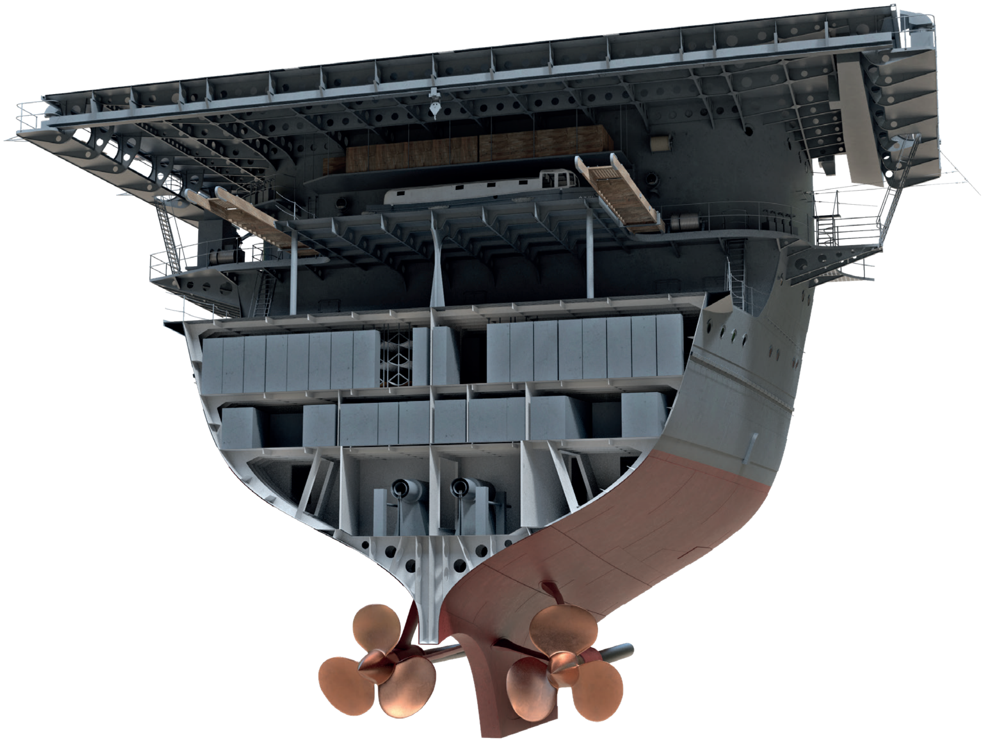
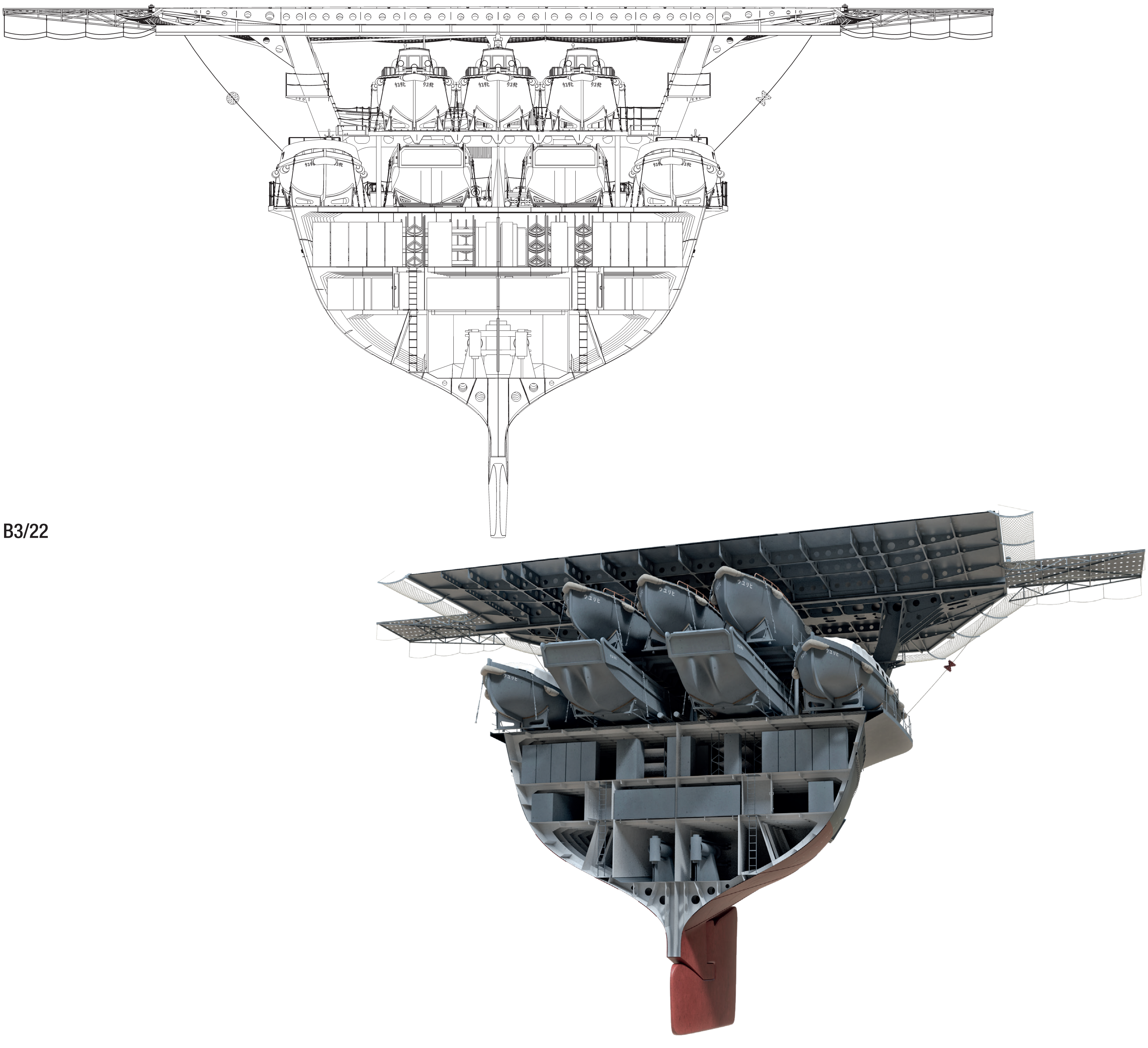


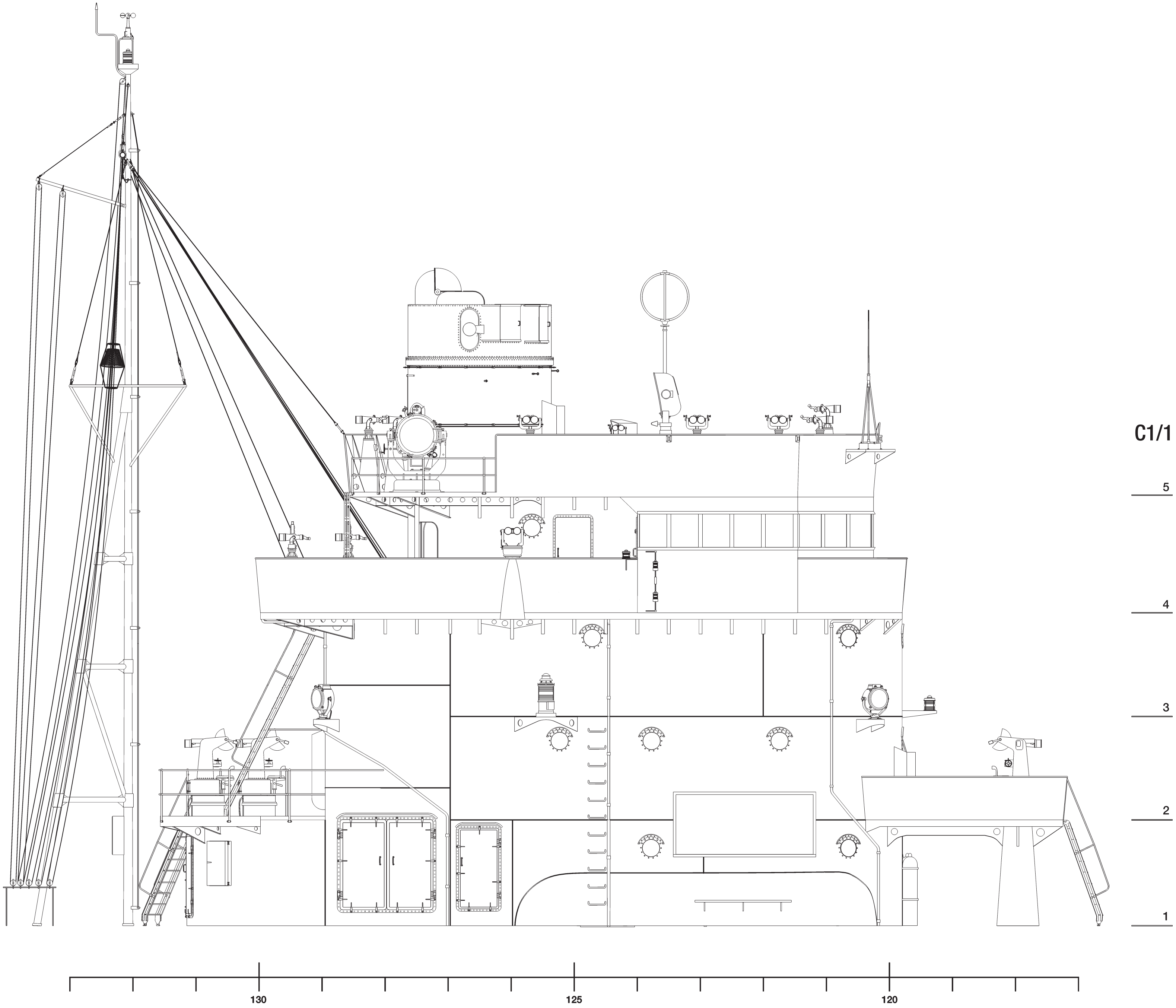


B3/22

SUPERSTRUCTURE AND MAST (1/100 SCALE)

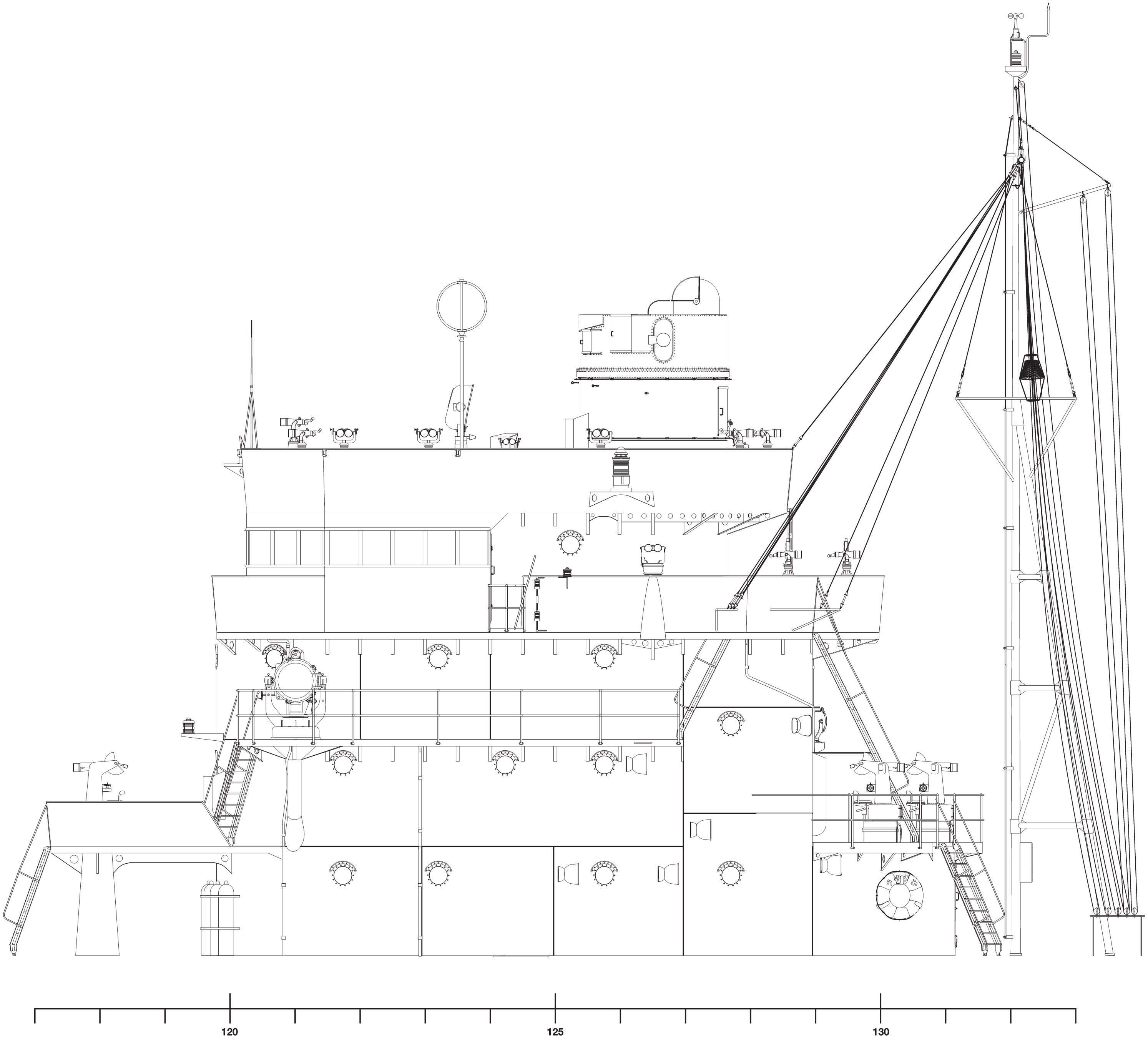
C1/1 RIGHT PROFILE

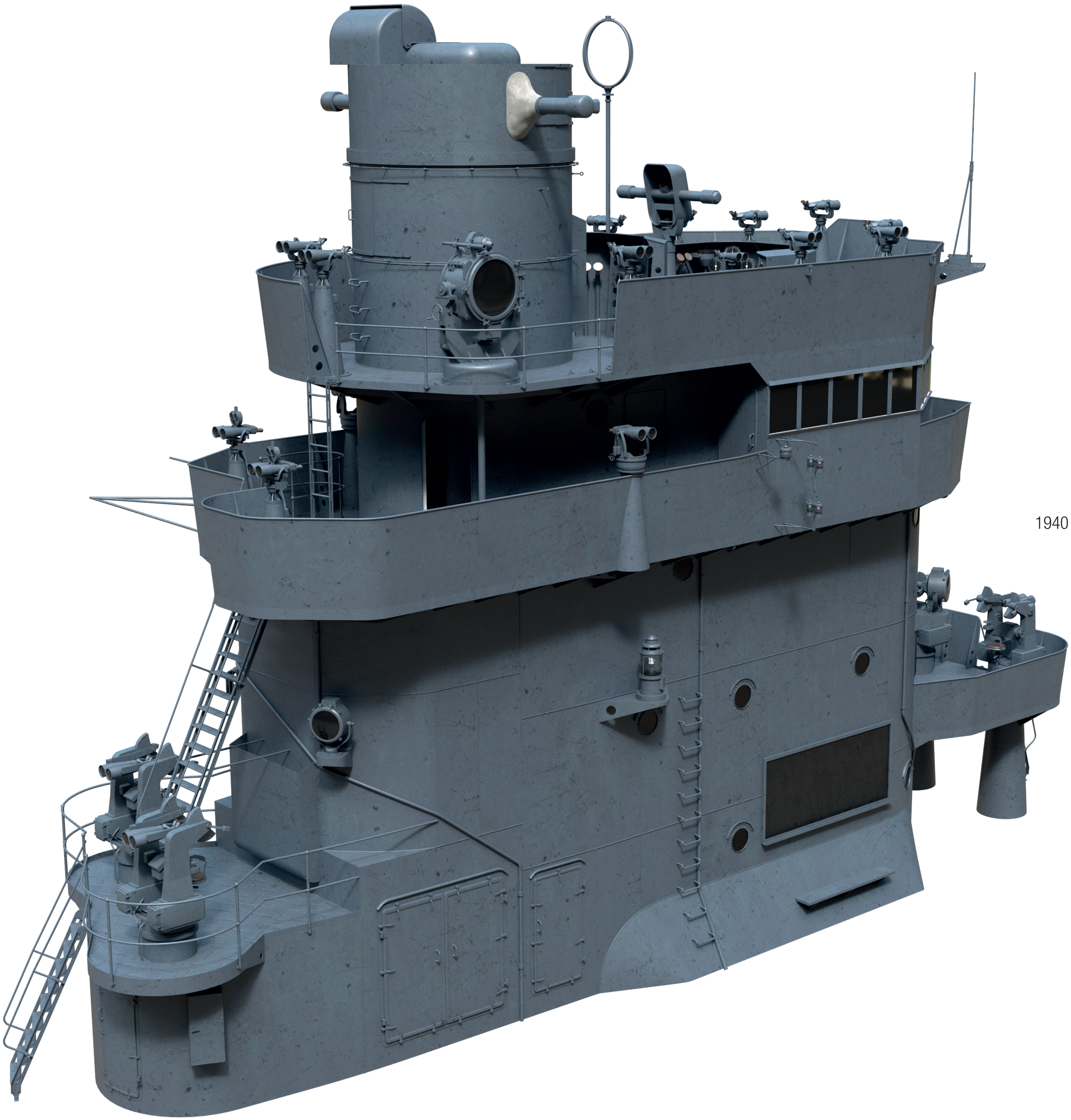
1 Flight deck level (飛行甲板平面 – hikōkōban heimen)
2 Lower bridge level (下部艦橋平面 – kabu kankyō heimen)
3 Upper bridge level (上部艦橋平面 – jōbu kankyō heimen)
4 Compass bridge level (羅針艦橋平面 – rashin kankyō heimen)
5 Air defence command post level (防空指揮所平面 – bōkū shikijo heimen)



C1/2 LEFT PROFILE

C1/2





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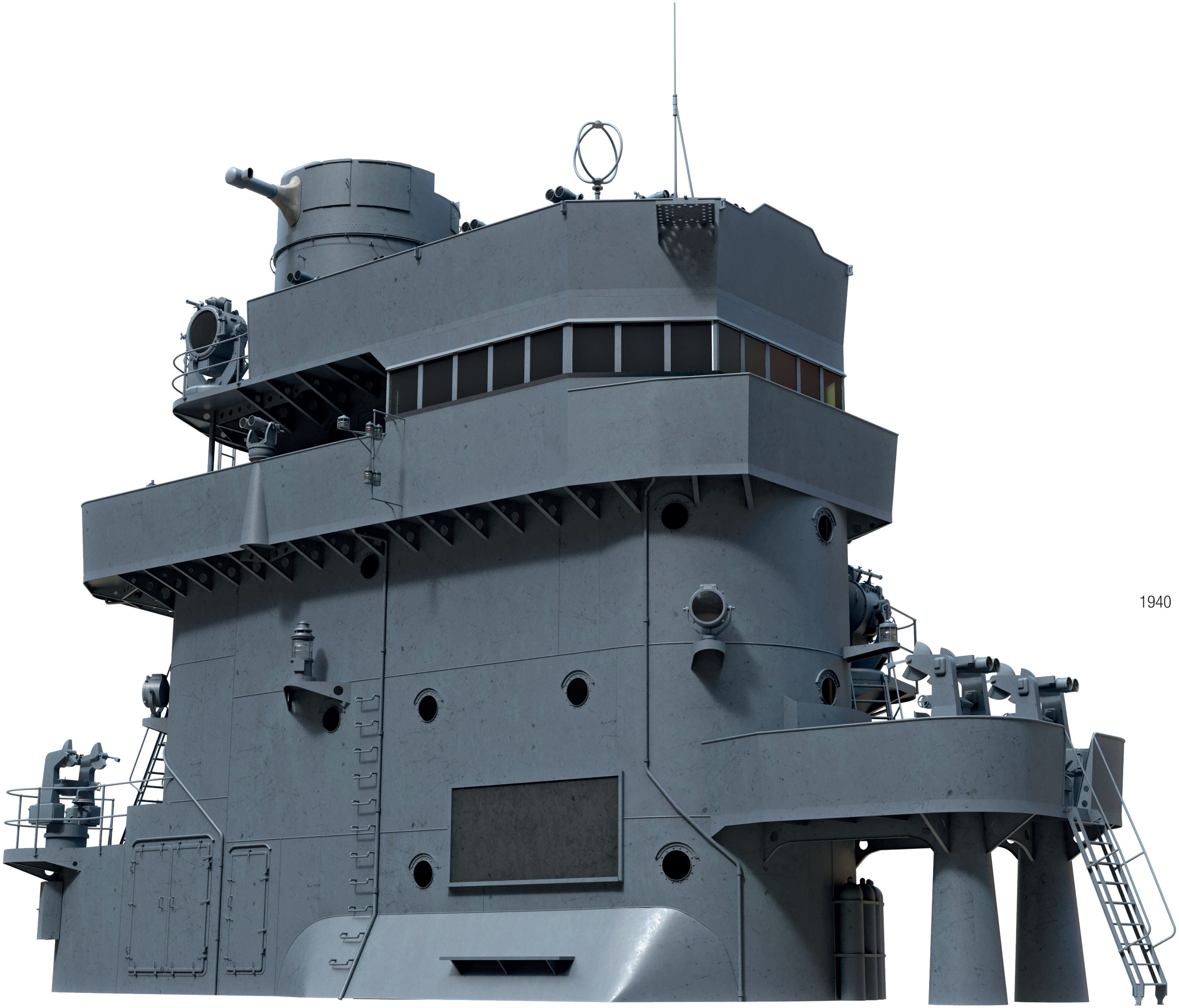

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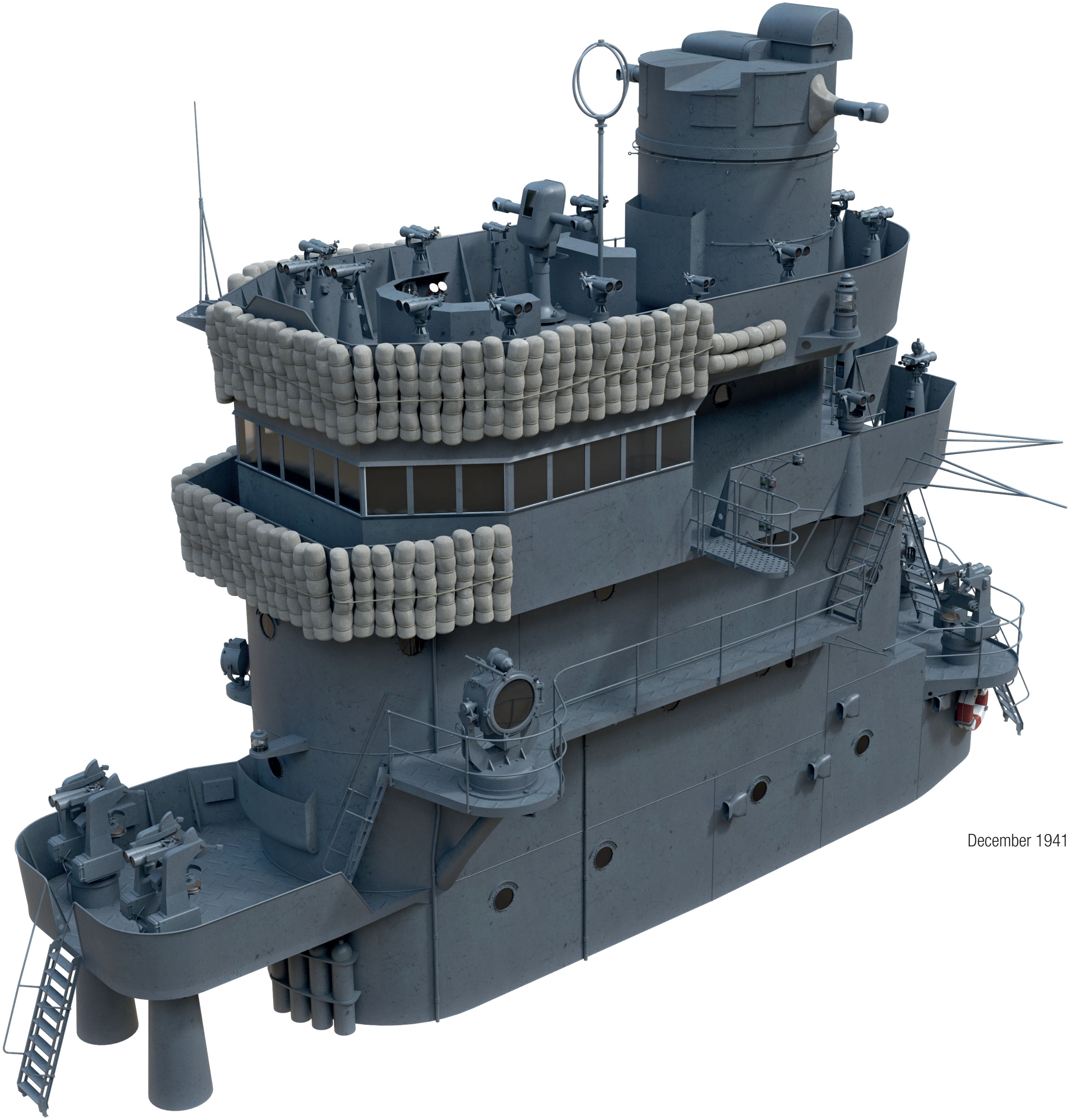
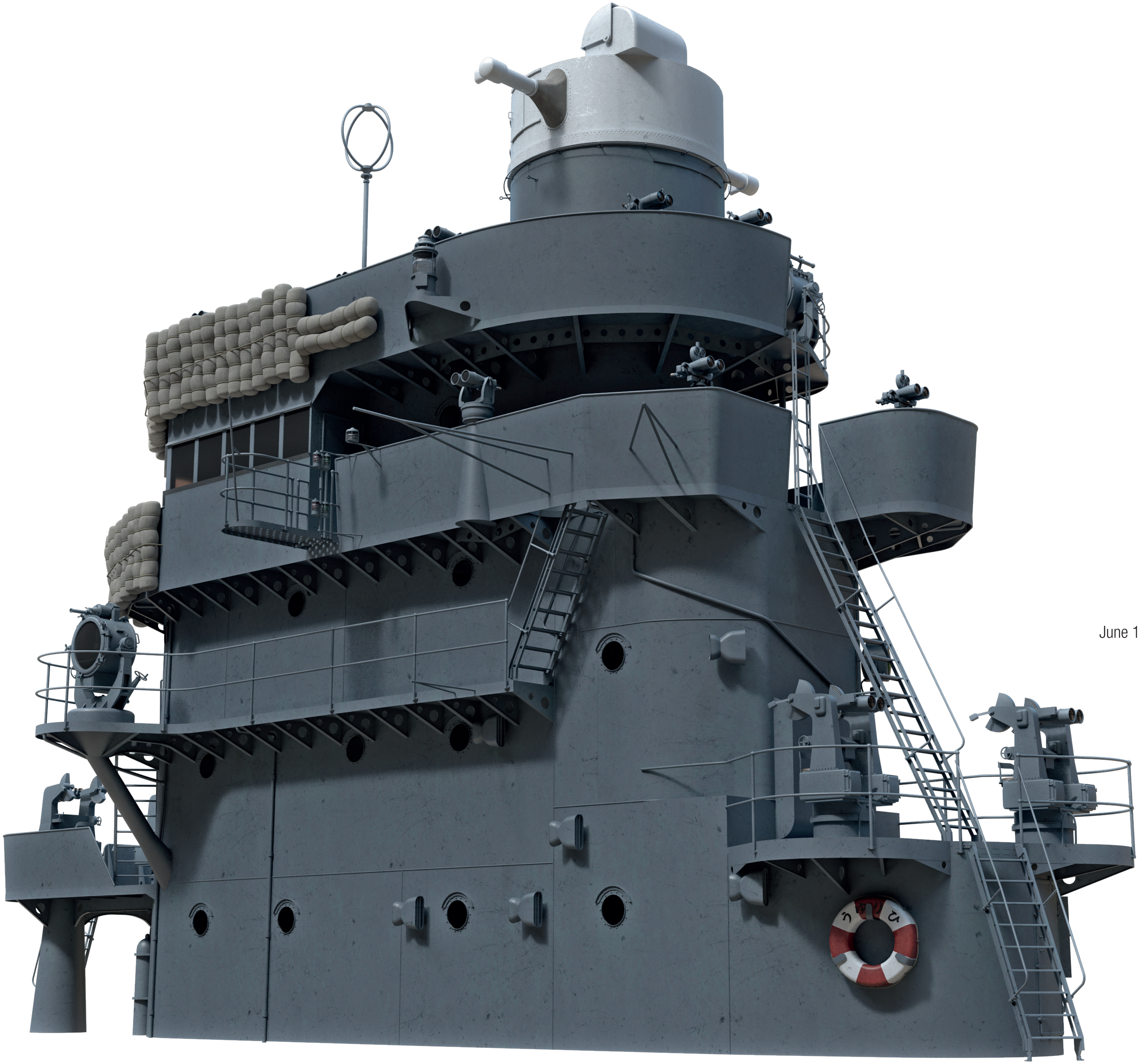
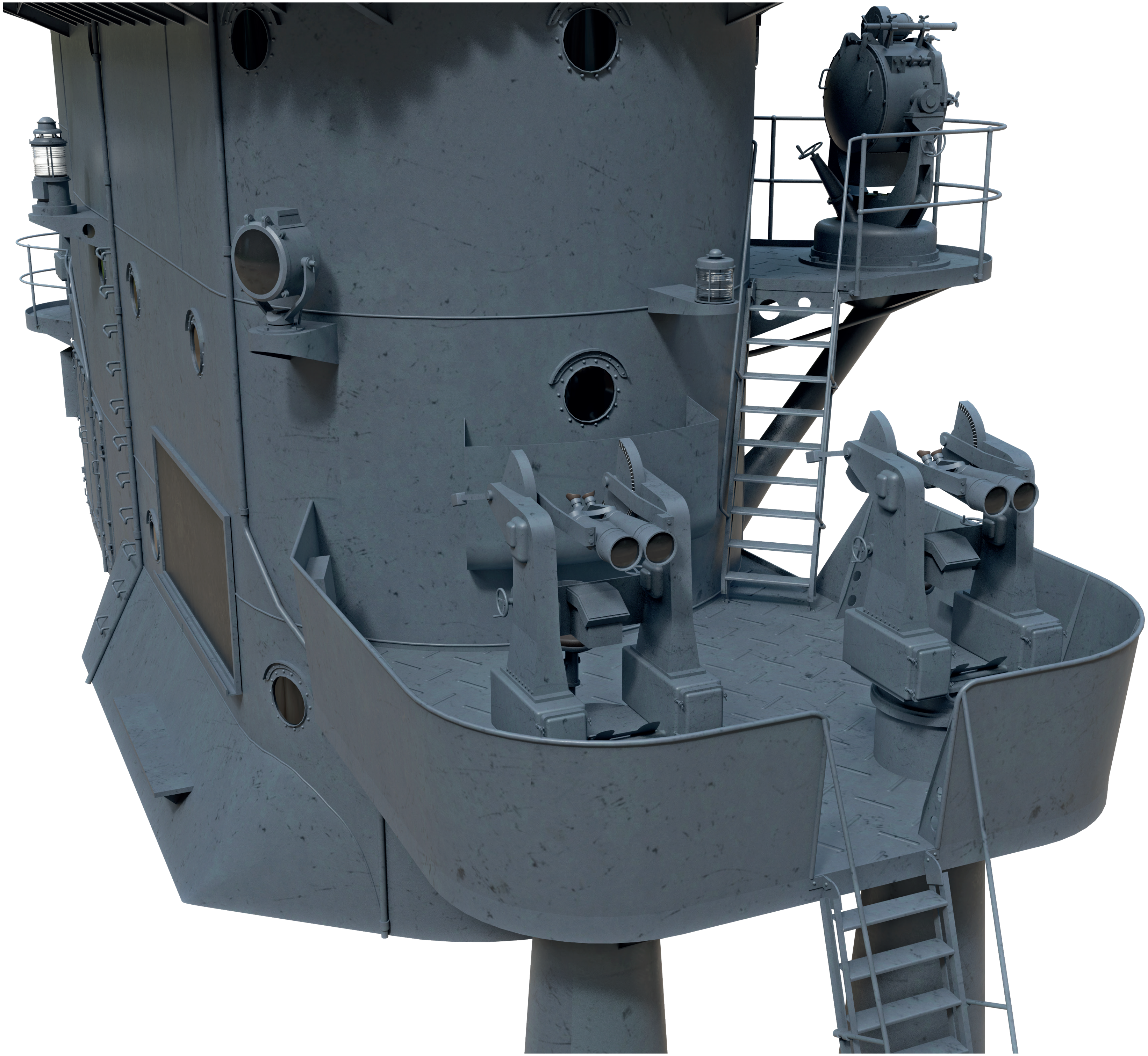
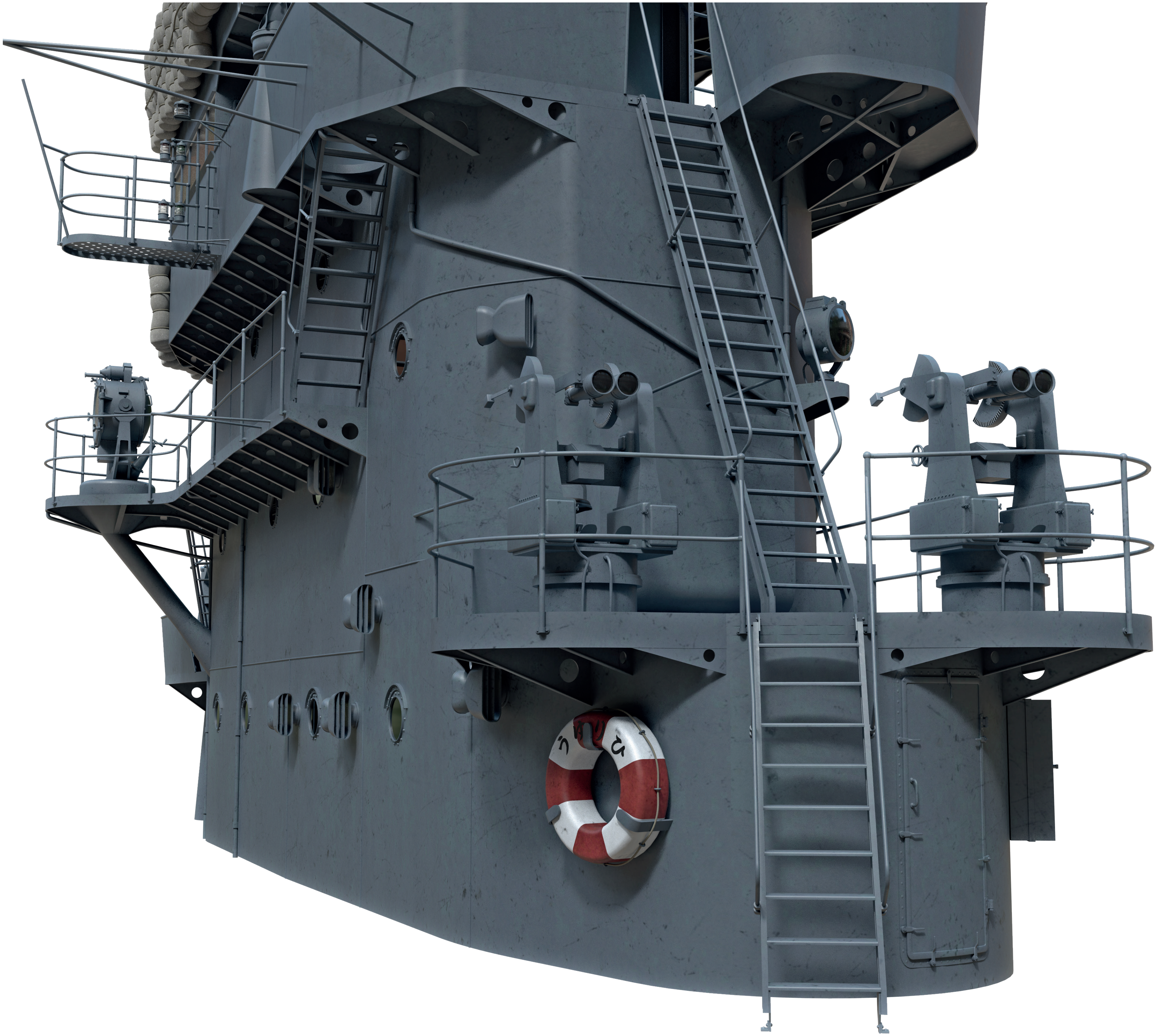


December 1941



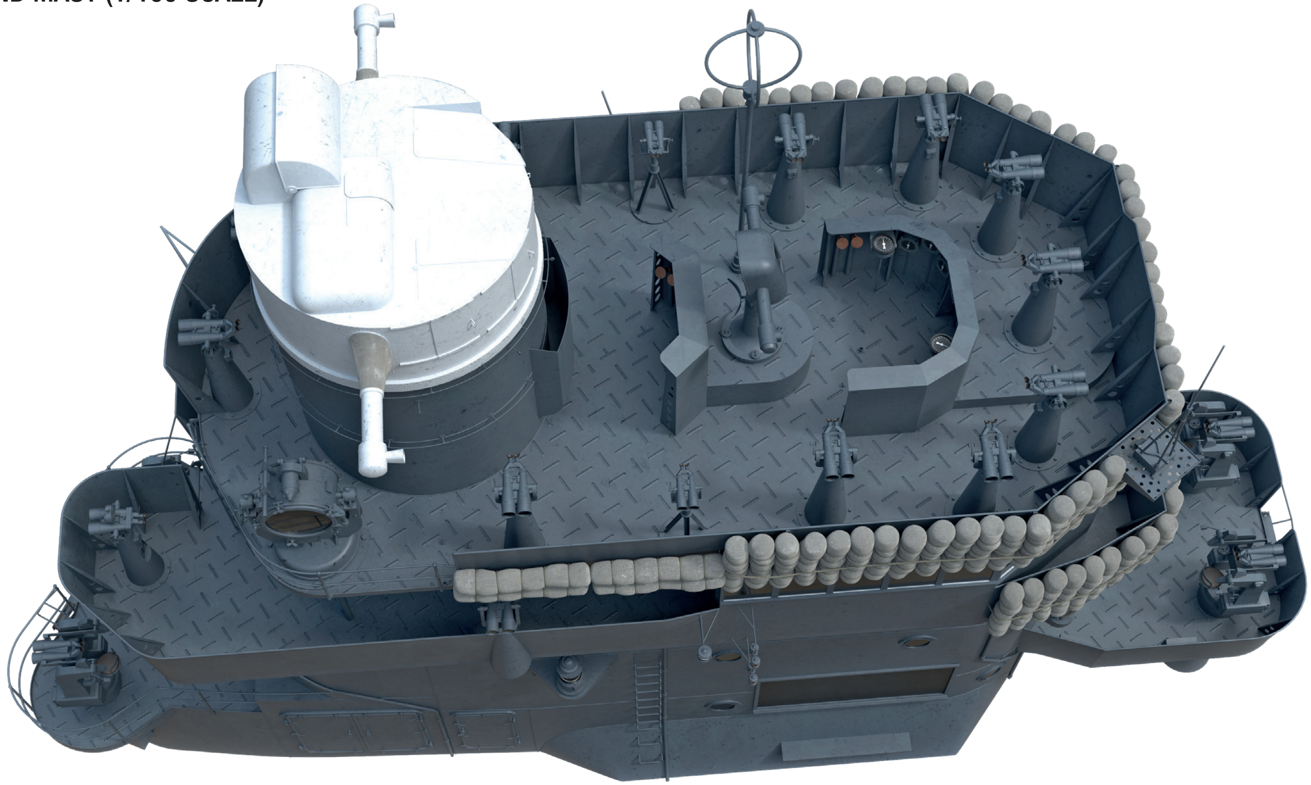
June 1942



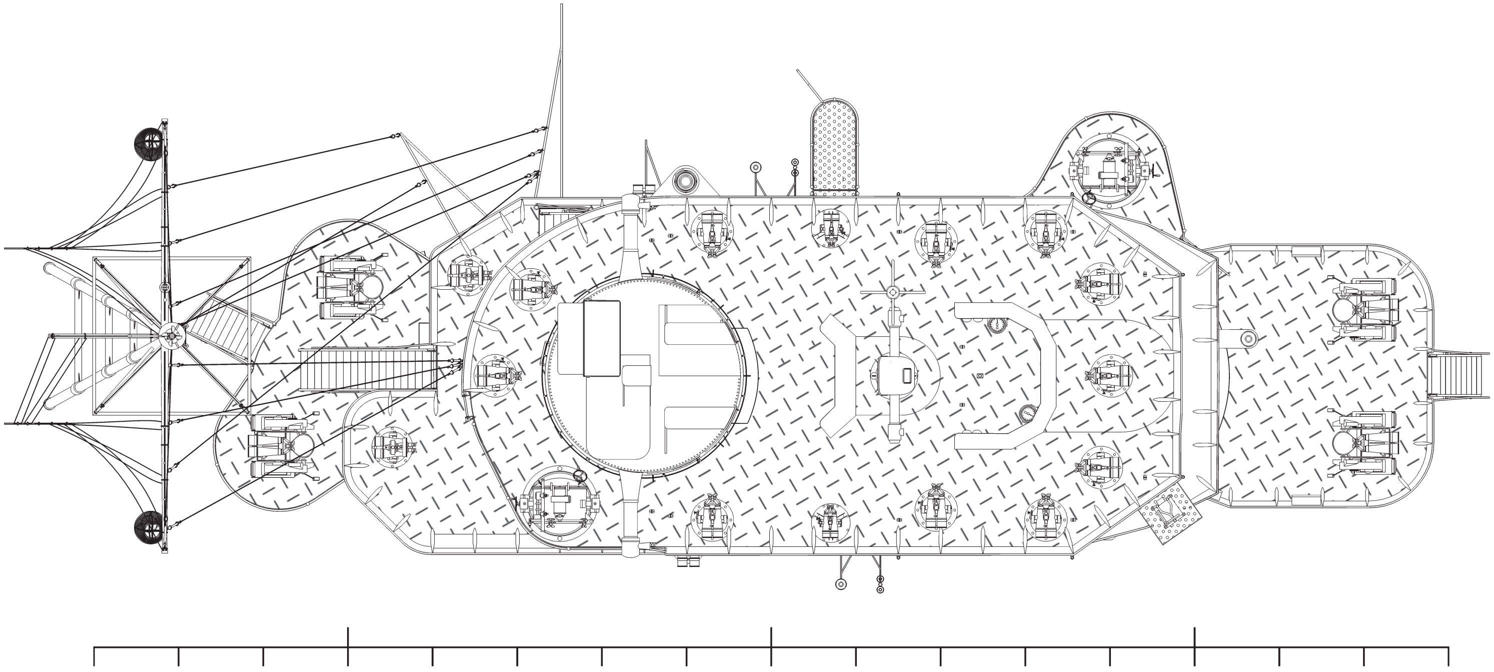


SUPERSTRUCTURE AND MAST (1/100 SCALE)

C1/3 PLAN



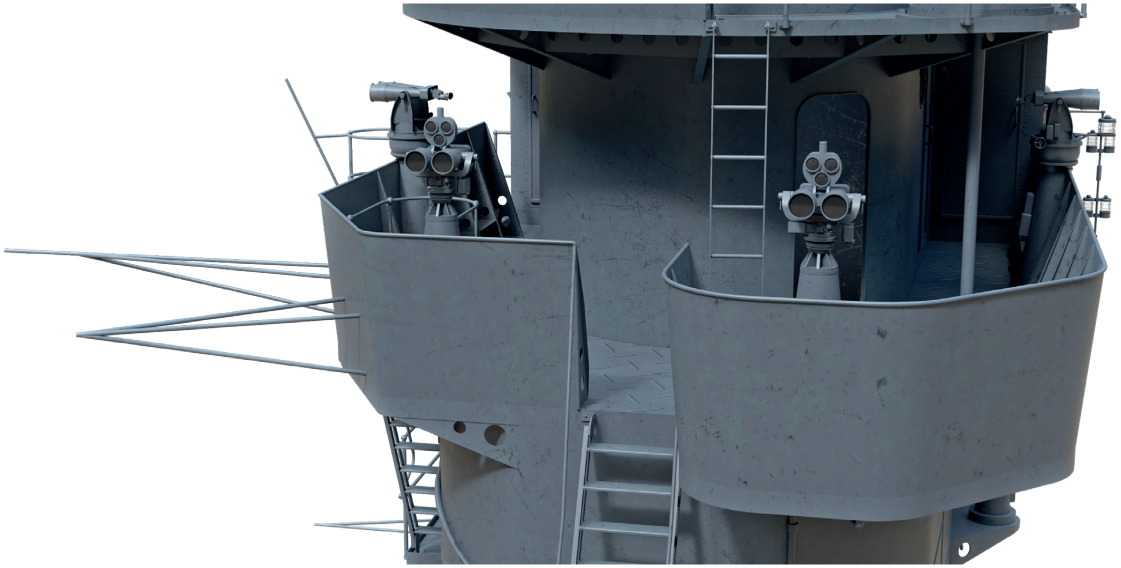
June 1942

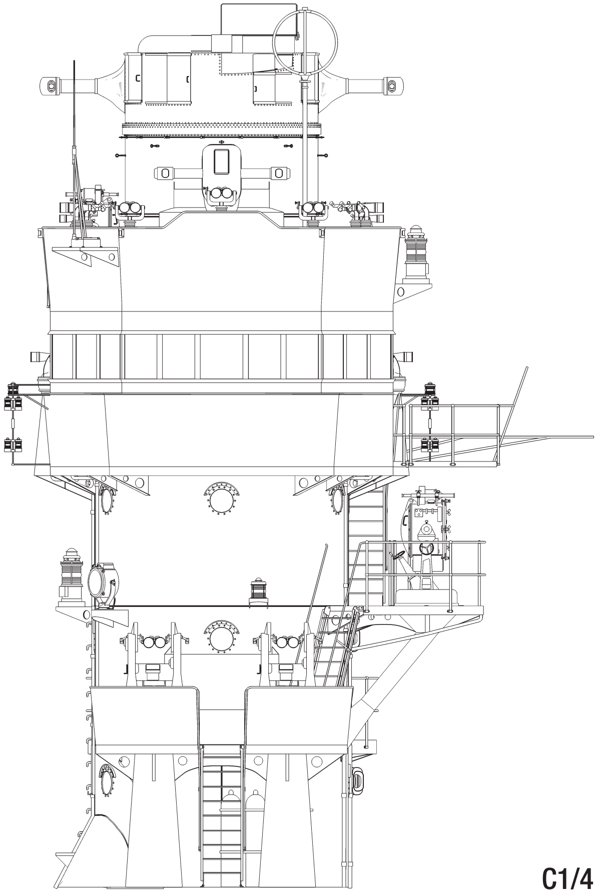

C1/3
130
125
120

SUPERSTRUCTURE (1/100 SCALE)

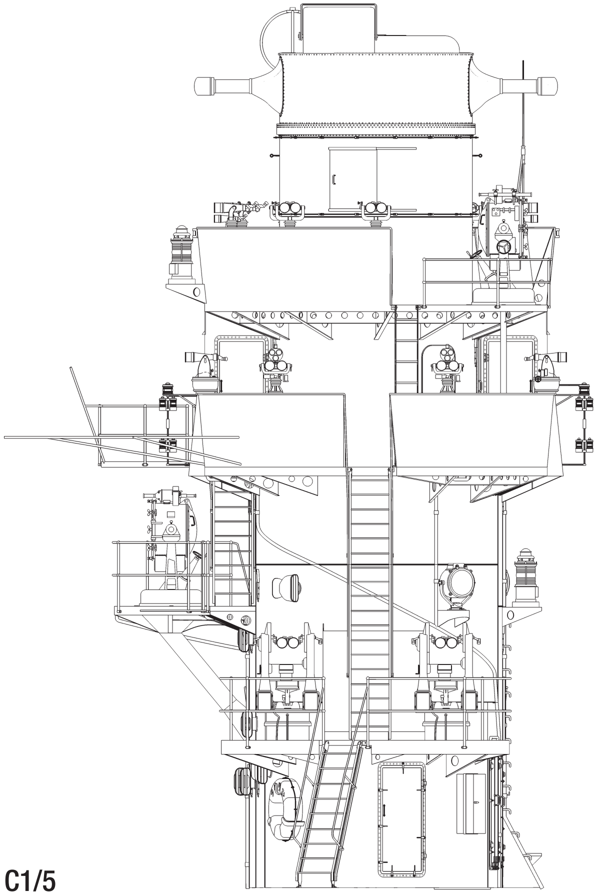
C1/4 FRONT VIEW

C1/5 BACK VIEW





C1/4

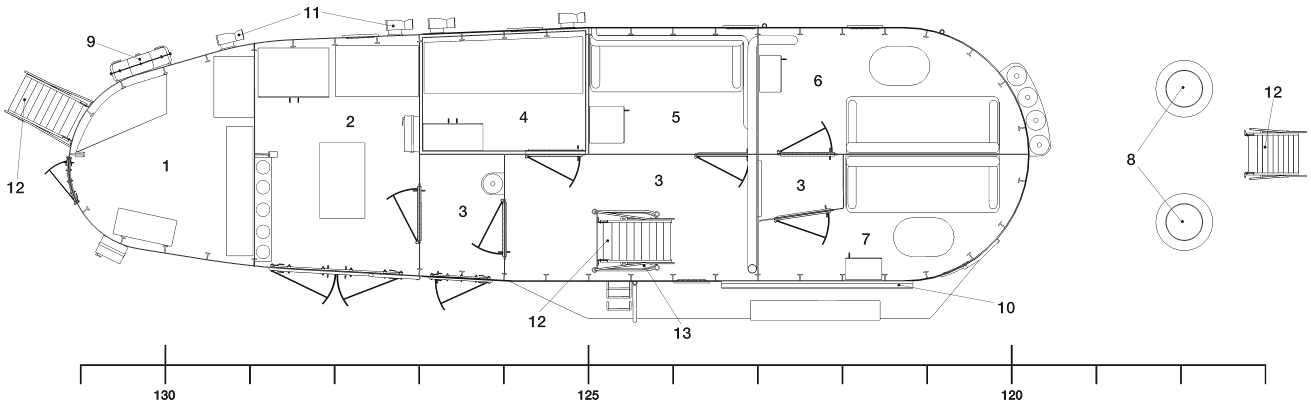


C1/5

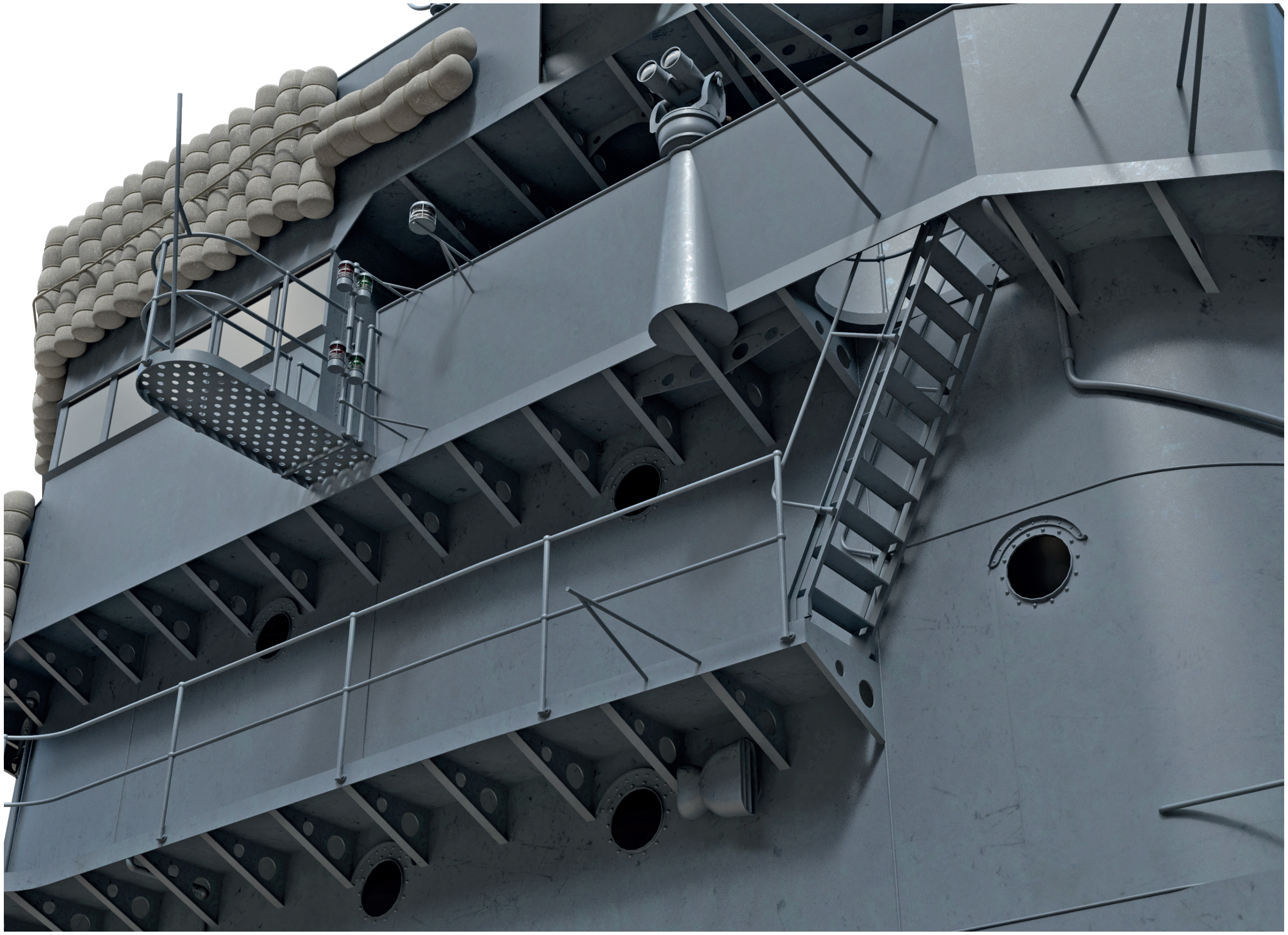
SUPERSTRUCTURE (1/100 SCALE)

C1/6 FLIGHT DECK LEVEL – PLAN

1 Signal flag storage room
2 Meteorological office
3 Passage
4 Telephone room
5 Navigating officer's sea cabin
6 Fleet commander's sea cabin
7 Captain's sea cabin
8 Support for searchlight director platform
9 Life ring
10 Flight operations blackboard
11 Wall vent
12 Ladder to deck above
13 Hatchway to deck below

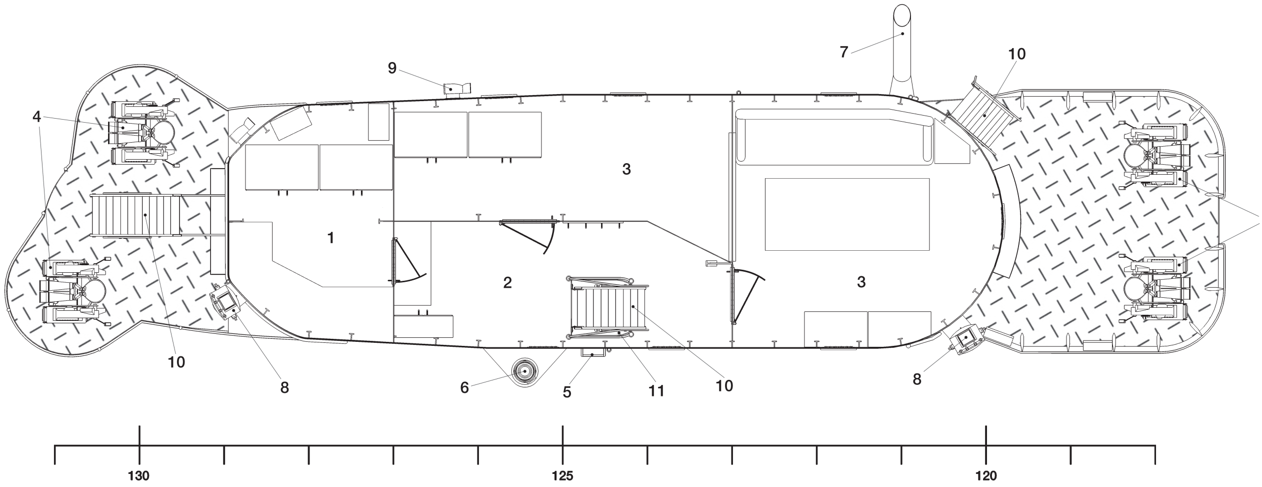


C1/6



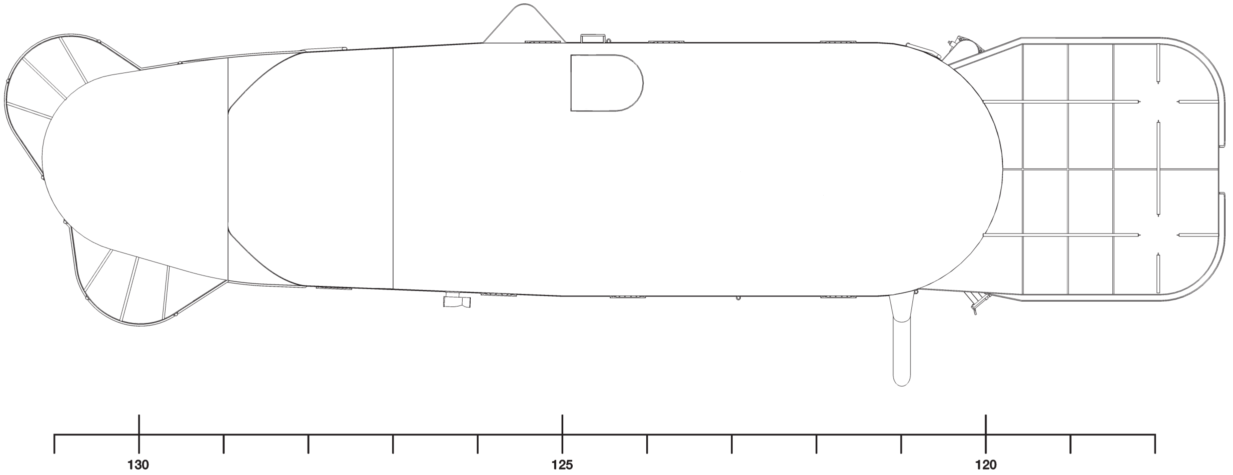
C1/7 LOWER BRIDGE LEVEL – PLAN

1 Nautical chart storage room
2 Passage
3 Operation and nautical chart room
4 Type 94 searchlight director and high angle binocular lookout
5 Foot step
6 2kW signal lamp
7 Signal searchlight support
8 30cm deck lamp
9 Wall vent
10 Ladder to deck above
11 Hatchway to deck below


9
7
10
4
3
1
2
3
4
10
8
6
5
11
10
8
130
125
120

C1/7

C1/8 LOWER BRIDGE LEVEL – BOTTOM VIEW

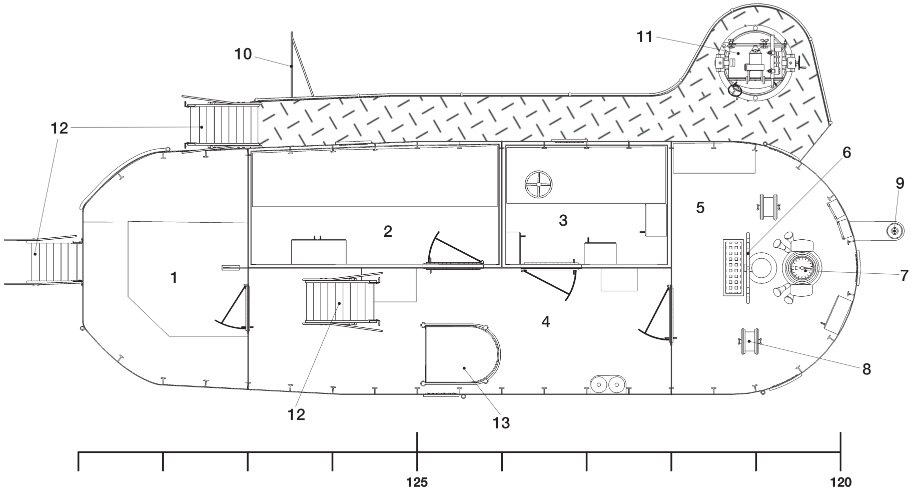


C1/8

SUPERSTRUCTURE (1/100 SCALE)

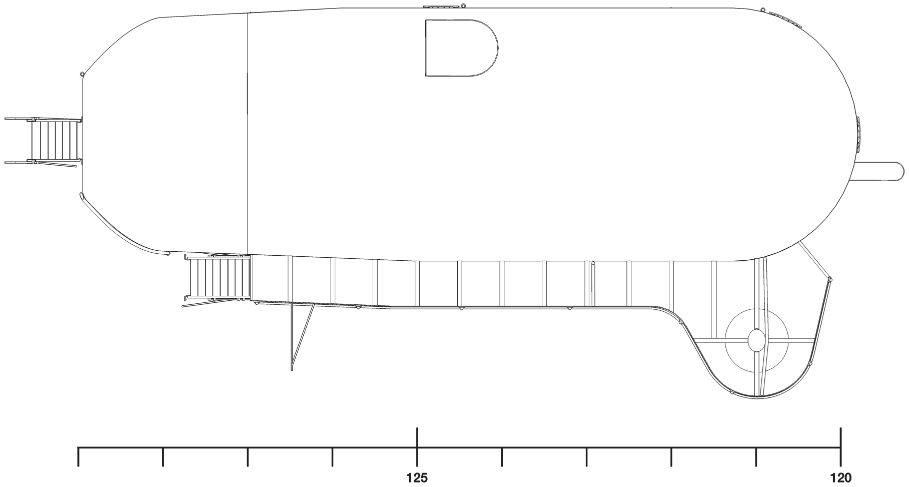
C1/9 UPPER BRIDGE LEVEL – PLAN

1. Navigation equipment storage room
2. Wireless communication room no. 3
3. Direction finding room no. 1
4. Passage
5. Wheelhouse
6. Ship's wheel
7. Magnetic compass
8. Speed transmitter
9. Lantern
10. Wire antenna outrigger
11. 60cm signal searchlight
12. Ladder to deck above
13. Hatchway to deck below

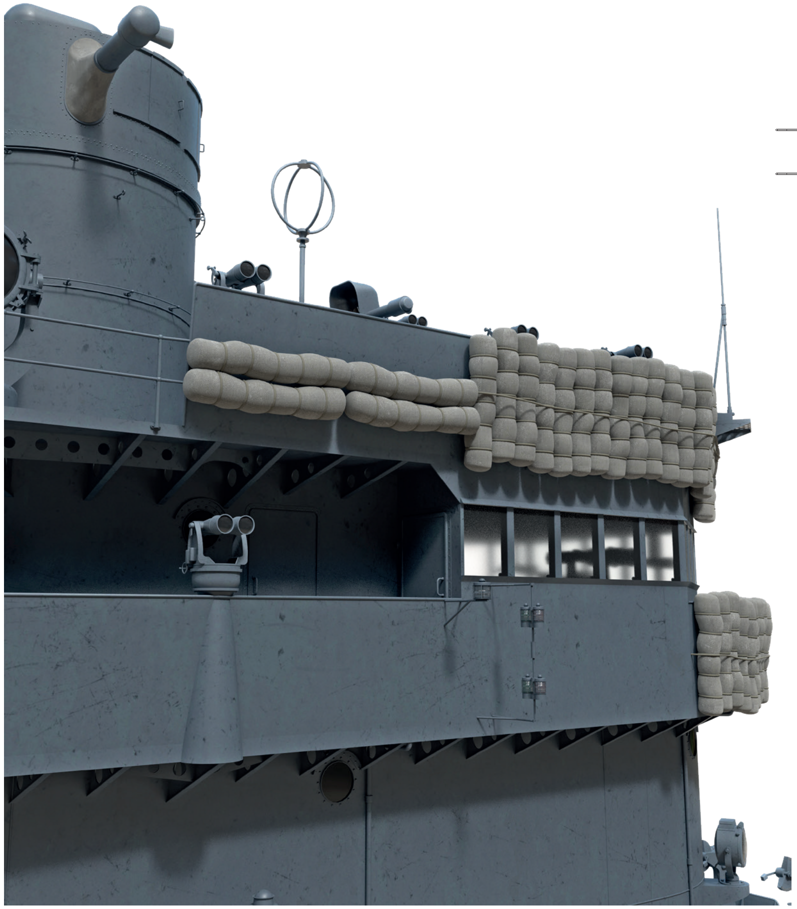


C1/9

C1/10 UPPER BRIDGE LEVEL – BOTTOM VIEW

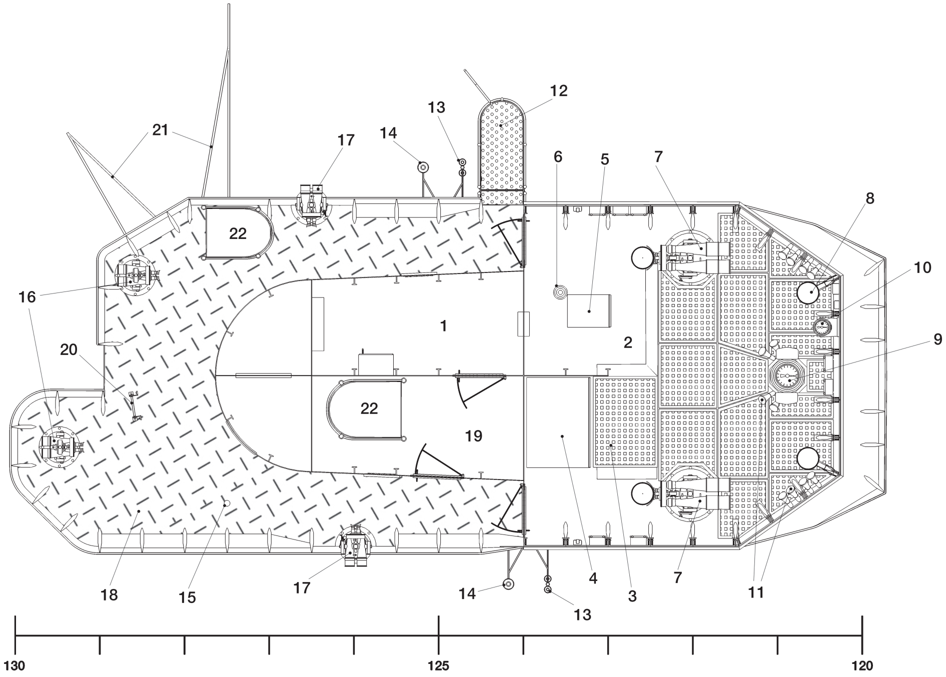


C1/10



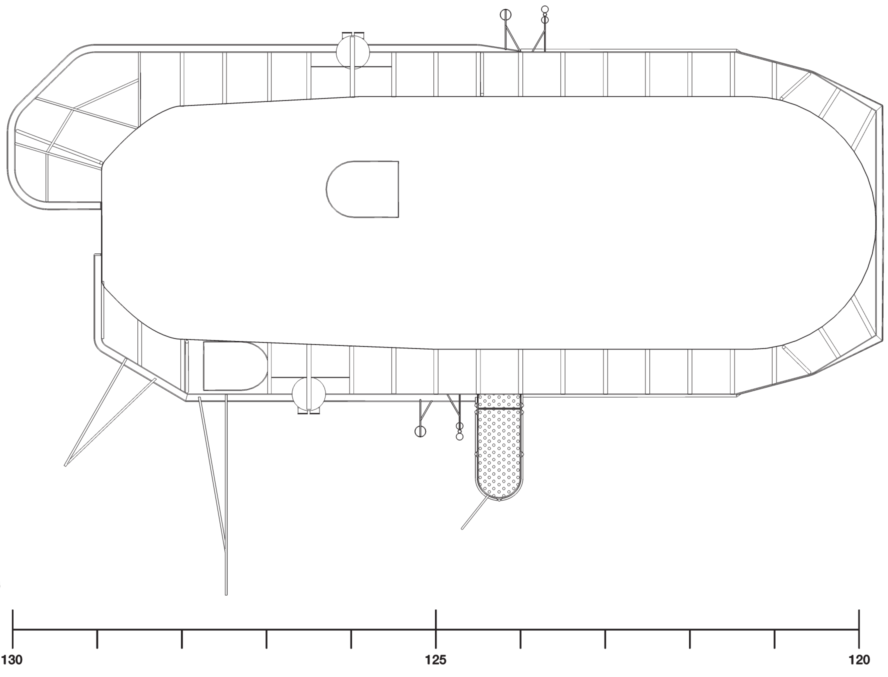
C1/11 COMPASS BRIDGE LEVEL – PLAN

1 Order transmission station
2 Compass bridge
3 Wooden grating
4 Nautical chart table
5 Ship's diary table
6 Base of direction finder antenna
7 18cm low-angle binocular mounting
8 Seat
9 Magnetic compass
10 Compass repeater
11 Voice tube
12 Hinged signalman's platform (folding forwards)
13 Emergency maneuver signal light array (inboard lights green, outboard lights red)
14 Course signal light
15 Signal searchlight support
16 12cm low-angle binocular mounting fitted with a Yamakawa light
17 12cm low-angle binocular mounting fitted with a compass
18 Flight operations command post
19 Passage
20 Vertical ladder
21 Wire antenna outrigger
22 Hatchway to deck below

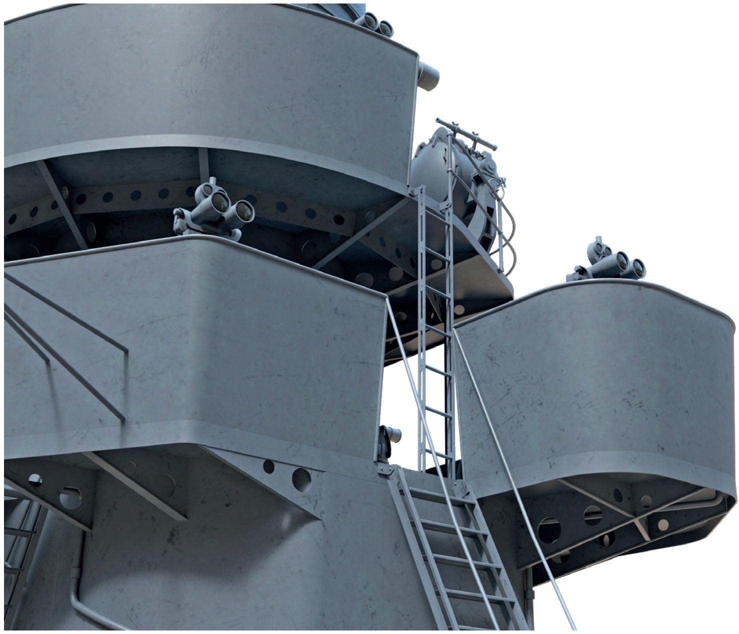


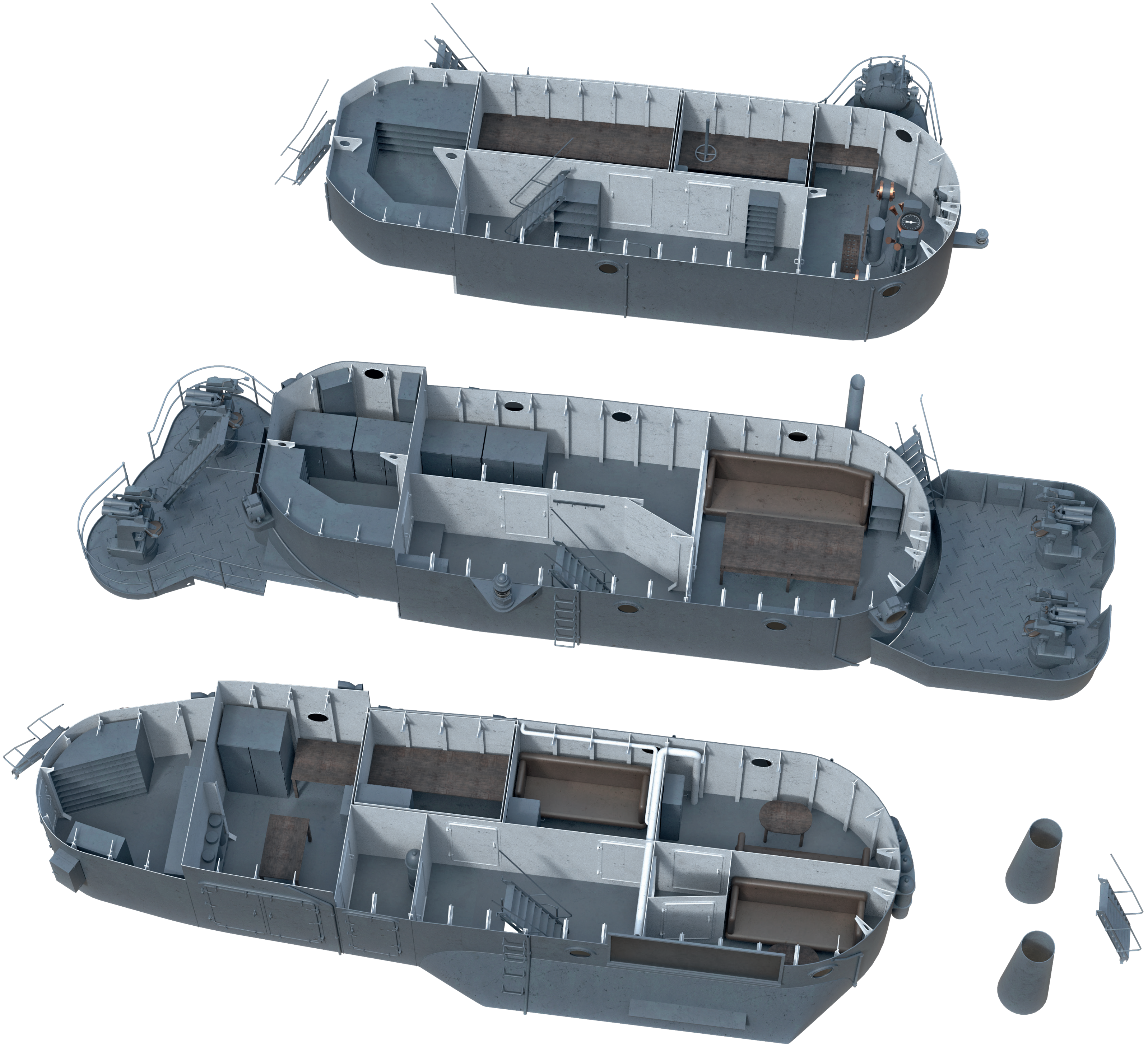
C1/11

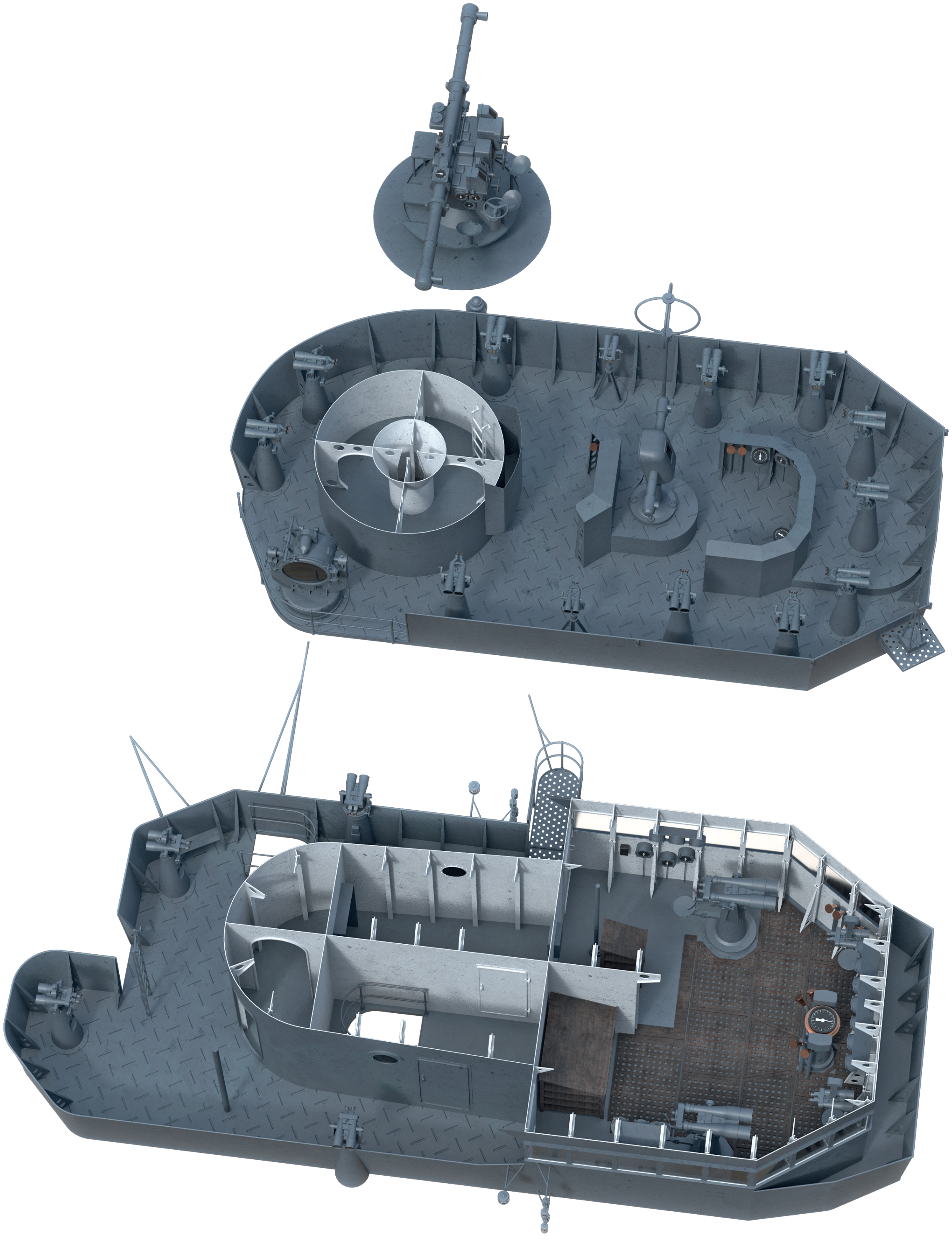
C1/12 COMPASS BRIDGE LEVEL – BOTTOM VIEW



C1/12



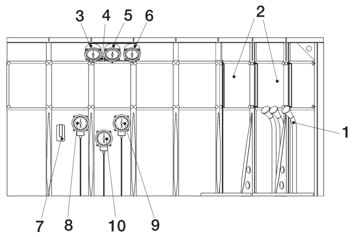




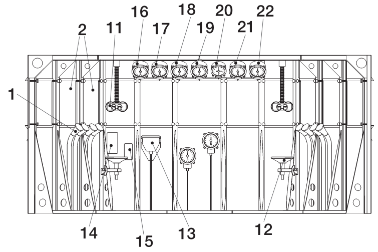
SUPERSTRUCTURE (1/100 SCALE)

C1/13 COMPASS BRIDGE, VIEW FROM THE CENTRELINE TOWARDS PORT SIDE

C1/14 COMPASS BRIDGE, VIEW FROM FRAME 122 TOWARDS THE BOW



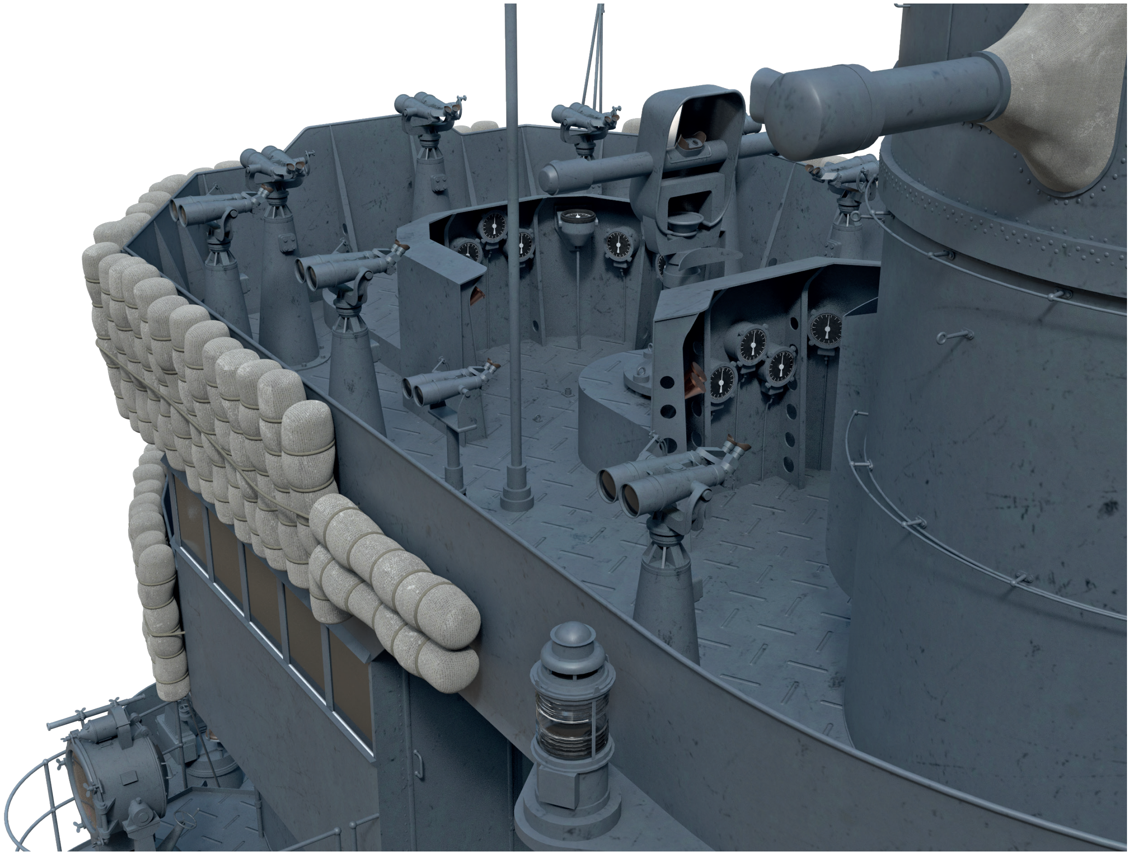
C1/13



C1/14

C1/13–14 COMPASS BRIDGE – APPROXIMATE EQUIPMENT LAYOUT

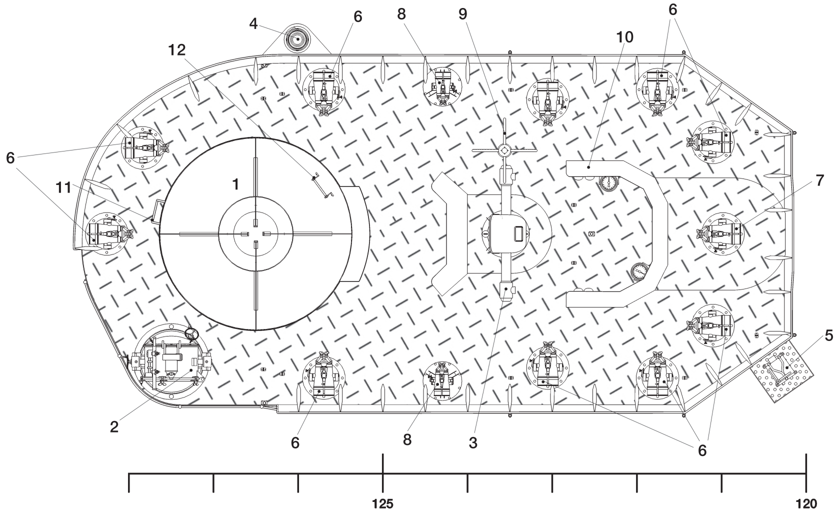
1 Voice tube
2 Window (vertically sliding)
3 High angle target bearing indicator
4 Direction alarm transmitter
5 High angle target elevation indicator
6 High angle target range indicator
7 Telephone
8 Order transmitter for machine guns
9 Order transmitter for high angle guns
10 Water depth indicator
11 12cm low-angle binoculars (ceiling mounting)
12 Seat
13 Compass repeater
14 Steering transmitter
15 Electric bell
16 Speed indicator
17 Port side outer shaft rpm indicator
18 Port side inner shaft rpm indicator
19 Rudder angle indicator
20 Clock
21 Starboard side inner shaft rpm indicator
22 Starboard side outer shaft rpm indicator



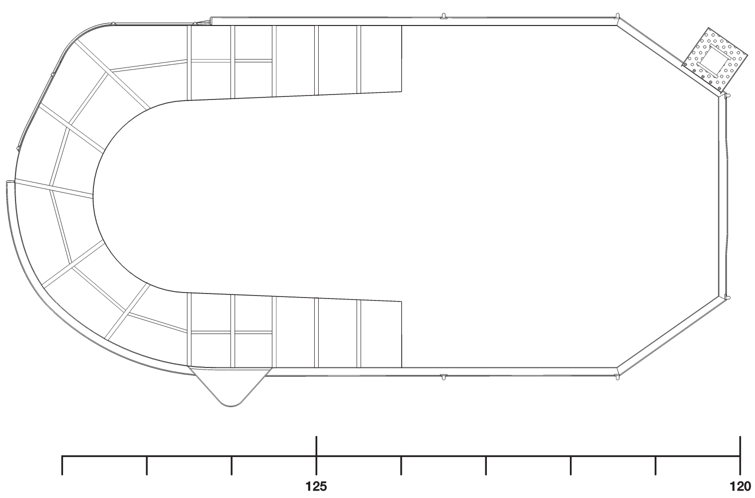
C1/15 AIR DEFENCE COMMAND POST LEVEL – PLAN

1 Type 94 high angle director base and cable shaft
2 60cm signal searchlight
3 1.5-metre rangefinder
4 2kW signal lamp
5 Type 90 wireless telephone transmitter antenna
6 12cm high angle binocular mounting
7 12cm high angle binocular mounting (for direct defence commander)
8 8cm high angle binocular mounting (for high angle fire control commander)
9 Direction finder loop antenna
10 Transmitting equipment screen
11 Foot step
12 Vertical ladder

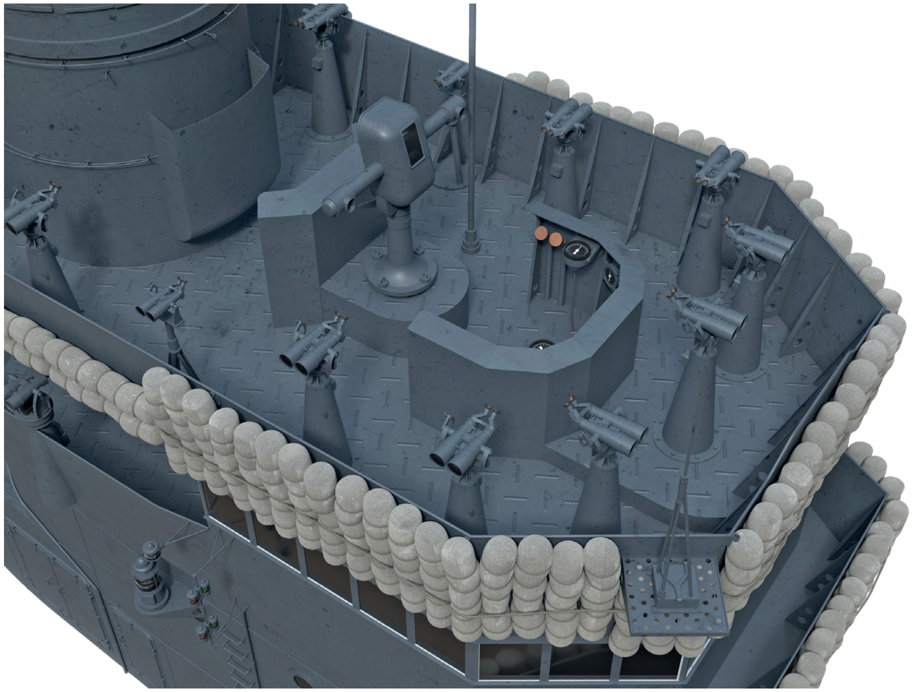
C1/16 AIR DEFENCE COMMAND POST LEVEL – BOTTOM VIEW



C1/15

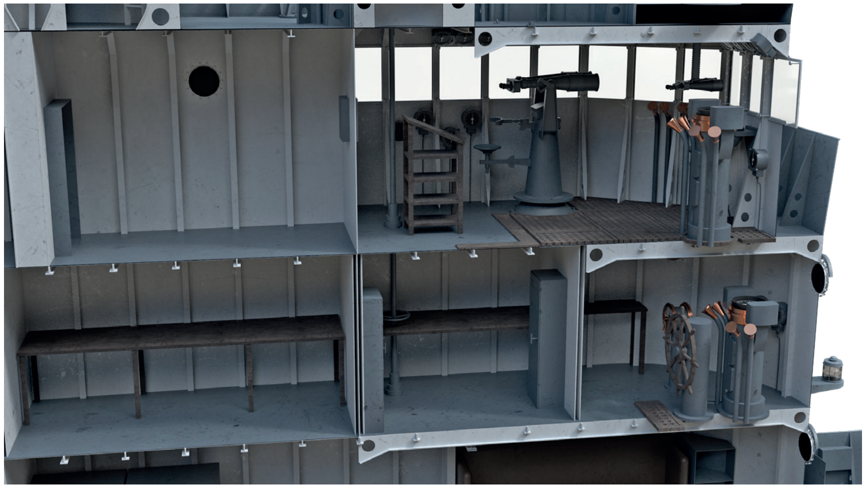


C1/16

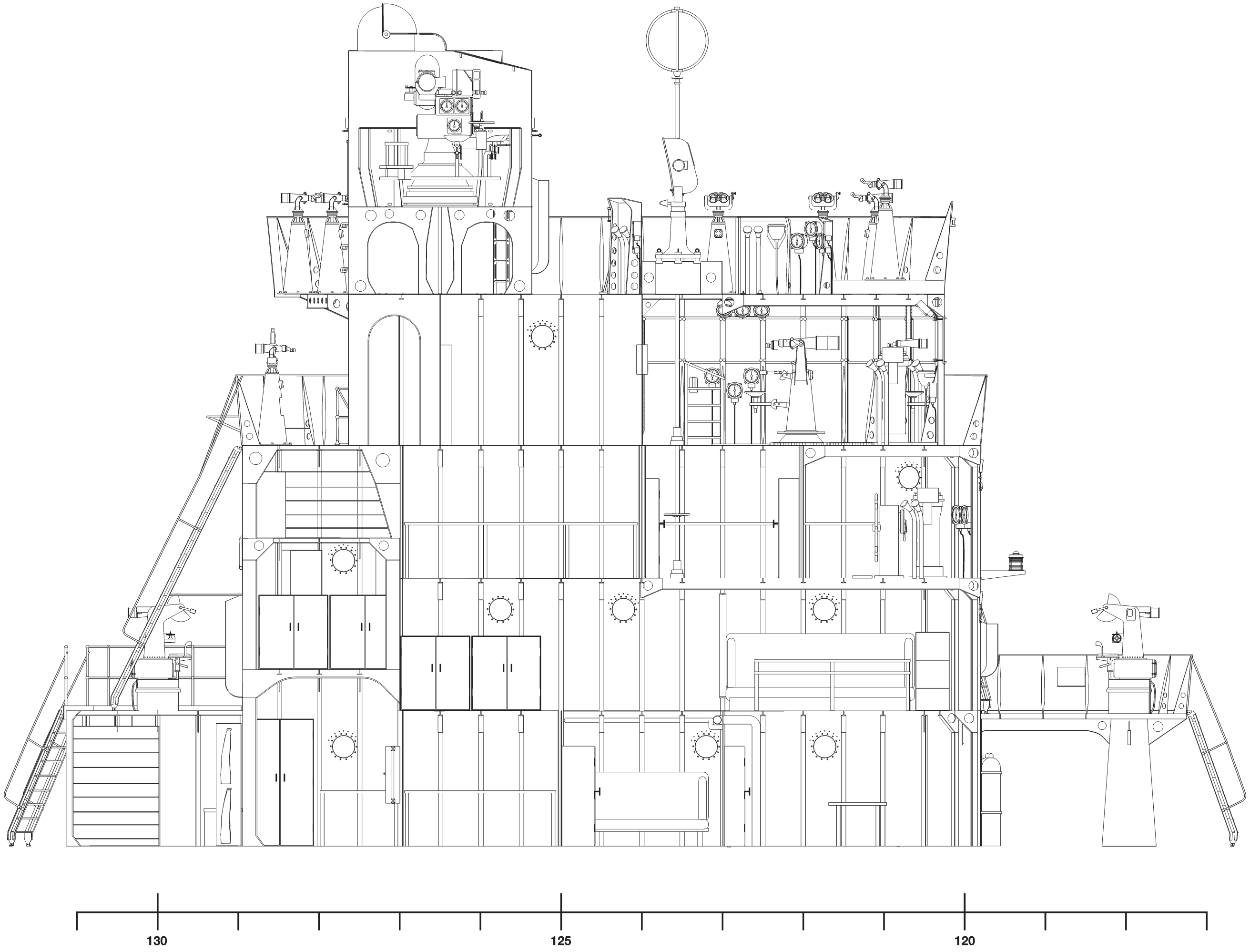


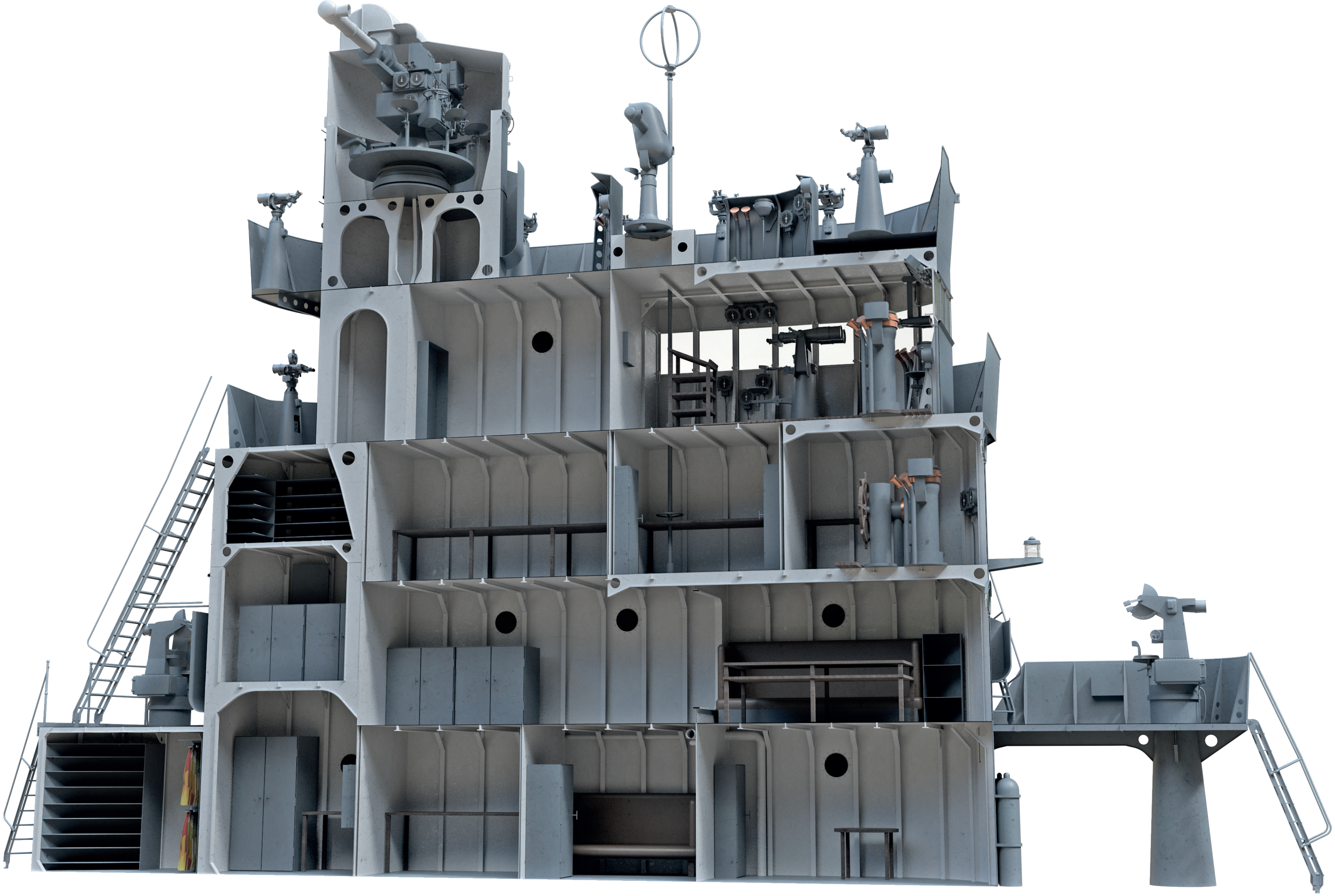
SUPERSTRUCTURE (1/100 SCALE)

C1/17 INTERNAL PROFILE



C1/17

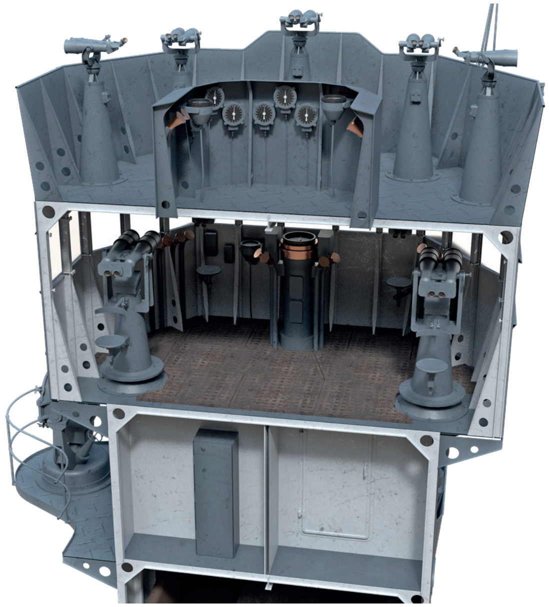


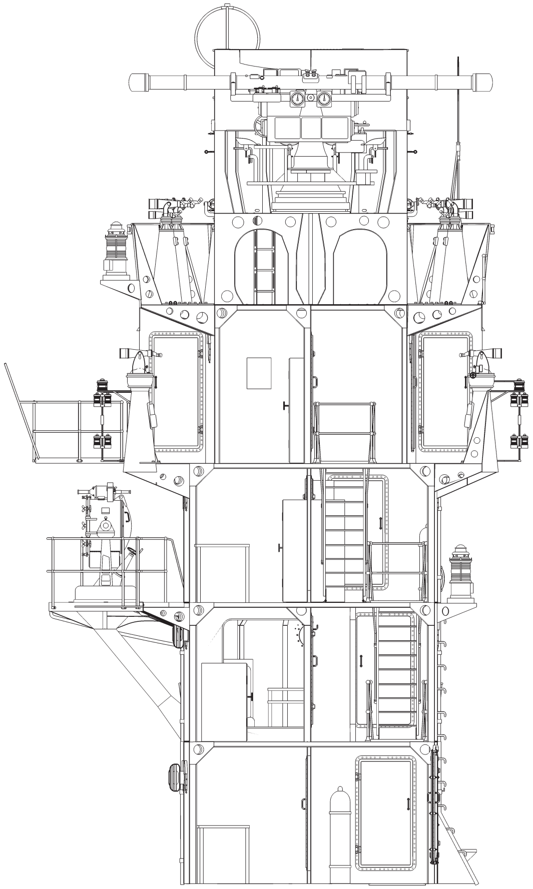


SUPERSTRUCTURE (1/100 SCALE)

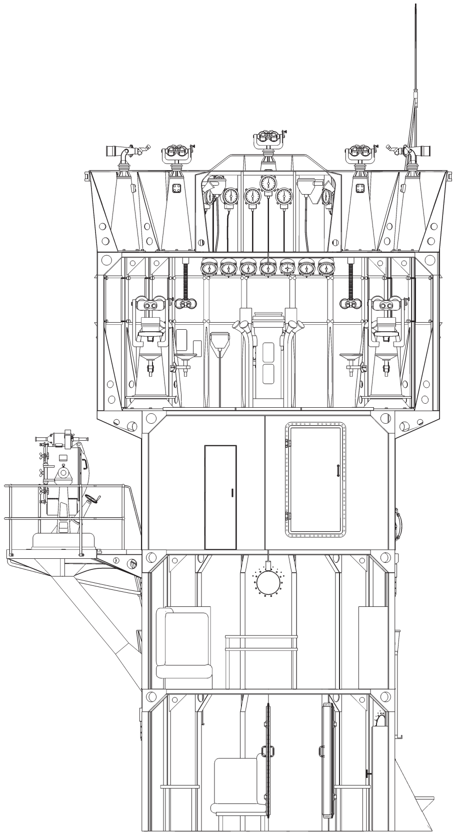
C1/18 SECTION VIEW FROM FRAME 127 TOWARDS THE BOW

C1/19 SECTION VIEW FROM FRAME 122 TOWARDS THE BOW

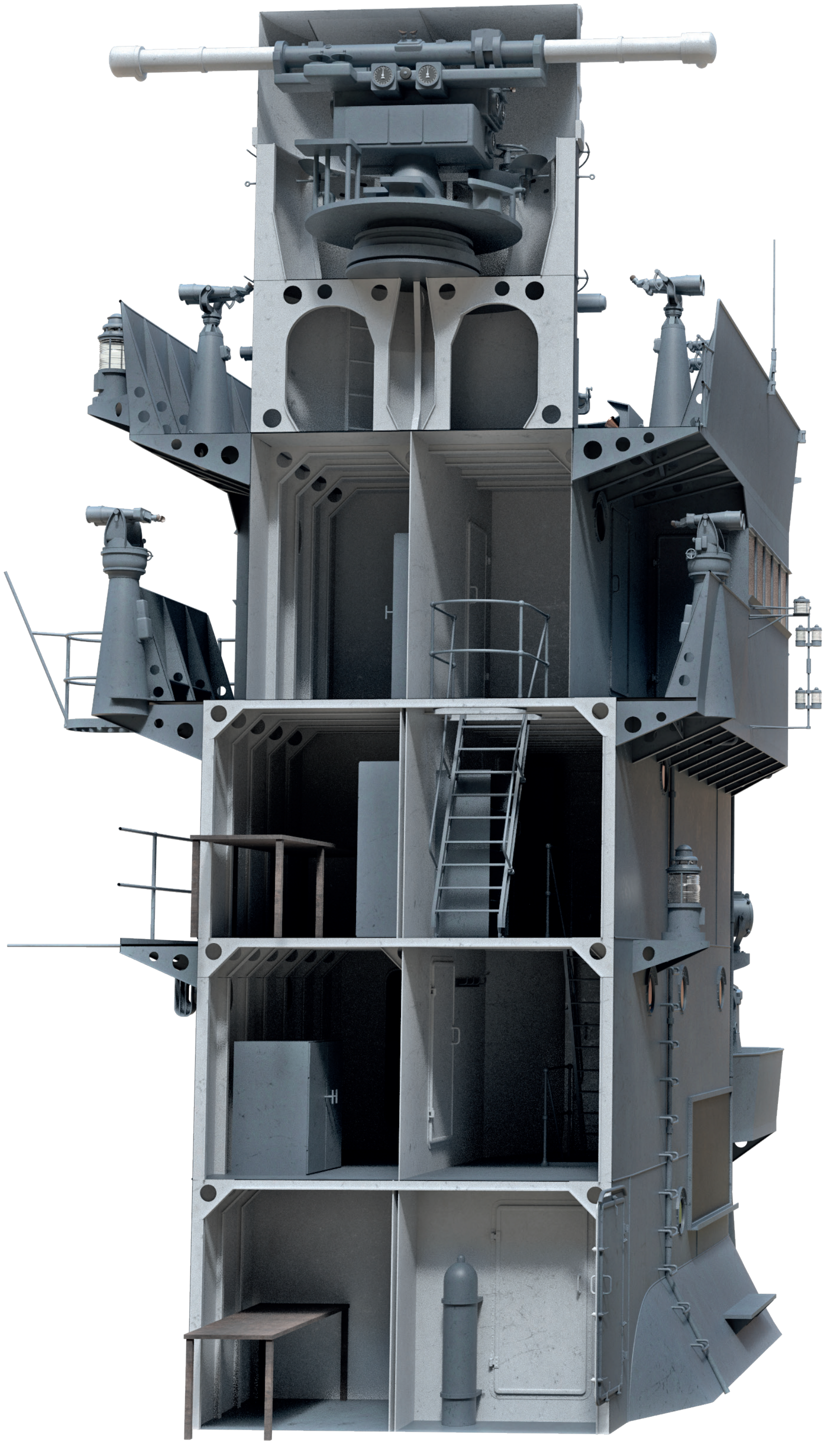


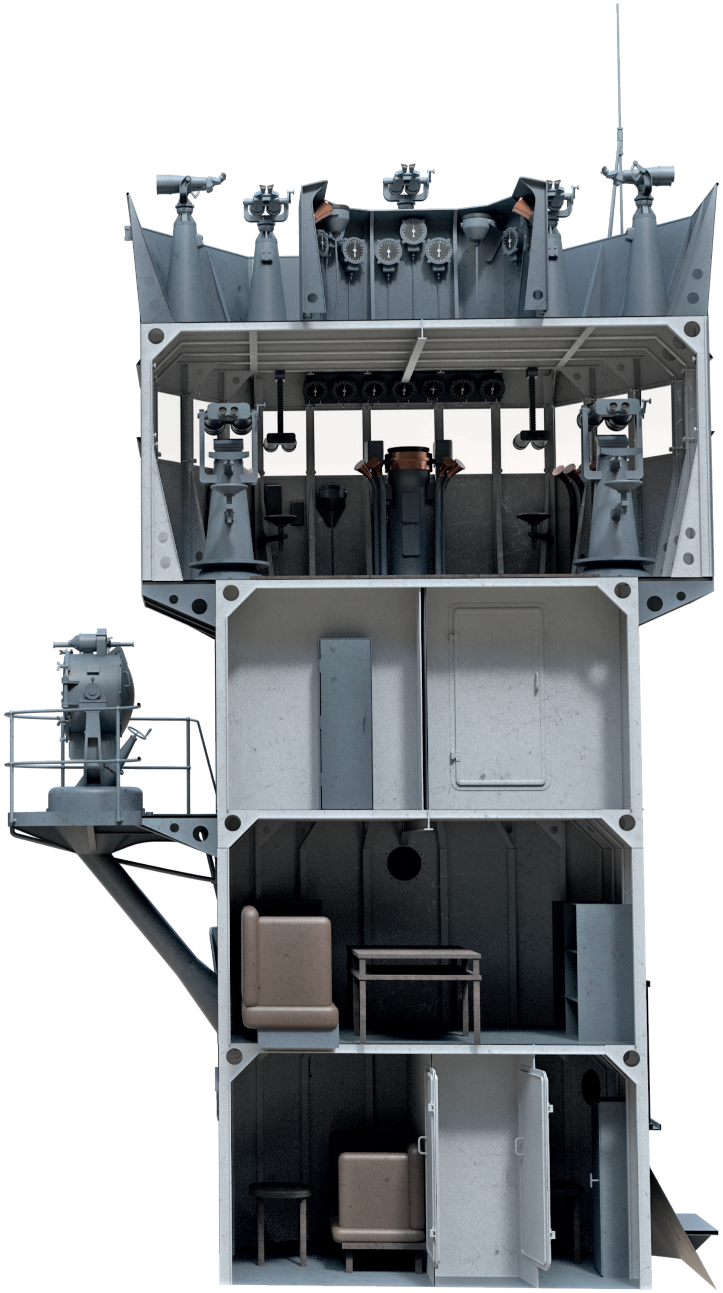


C1/18



C1/19

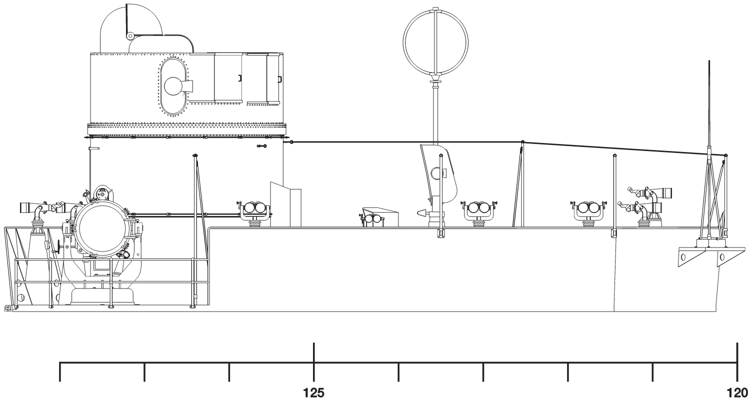




SUPERSTRUCTURE (1/100 SCALE)

C1/20 AIR DEFENCE COMMAND POST LEVEL WITH AWNING STANCHIONS RIGGED – RIGHT PROFILE

C1/21 AIR DEFENCE COMMAND POST LEVEL WITH AWNING STANCHIONS RIGGED – PLAN



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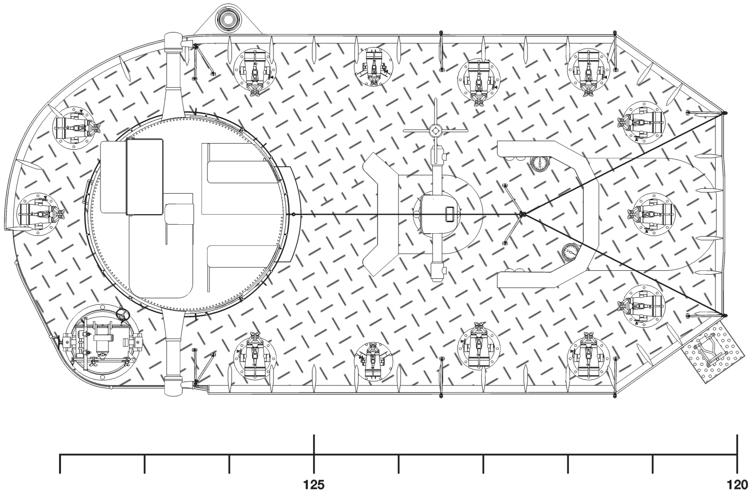
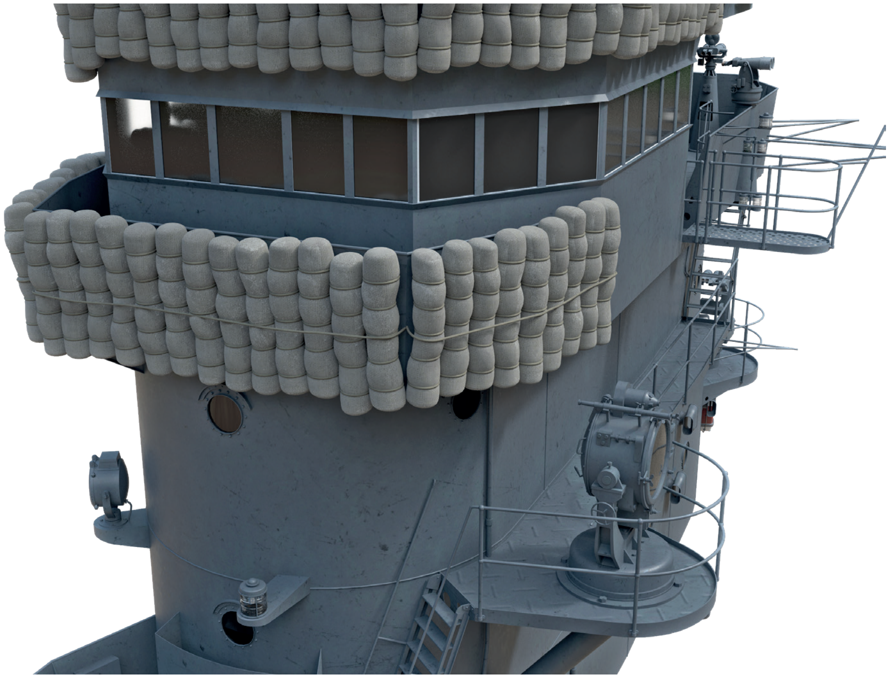
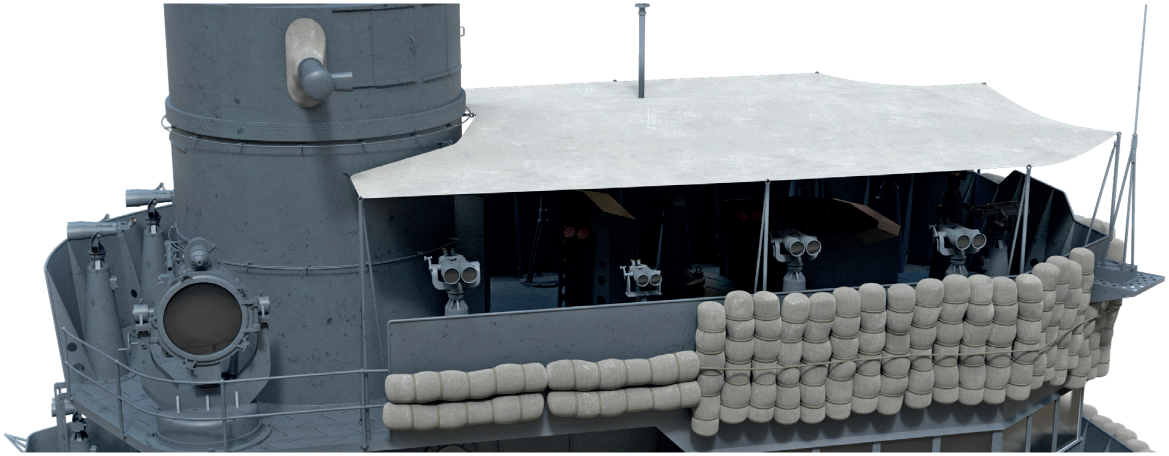
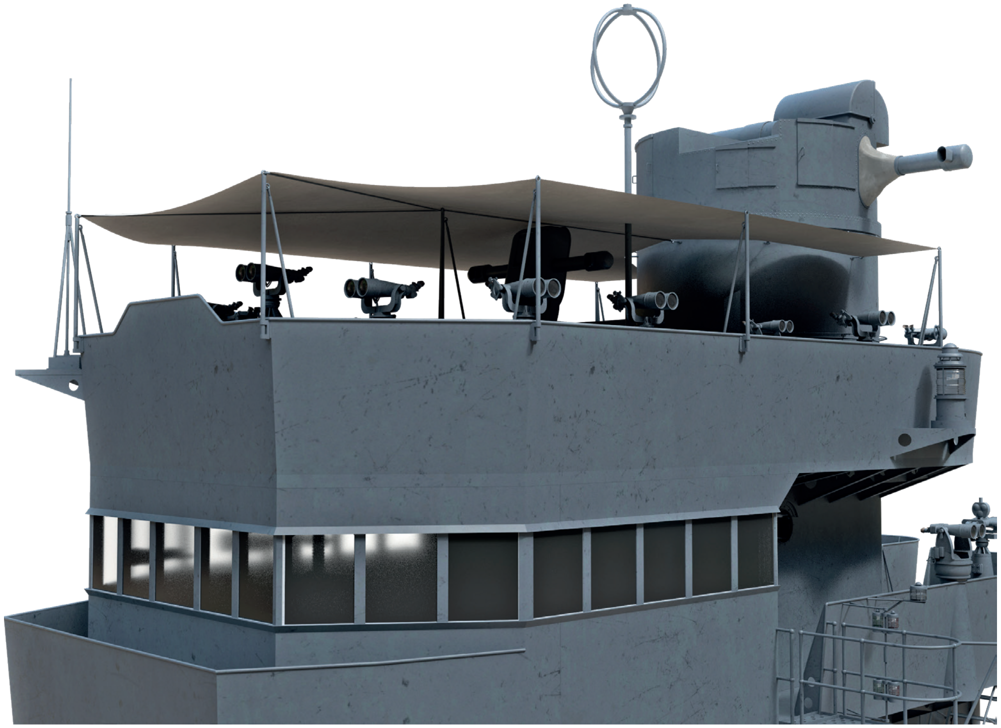
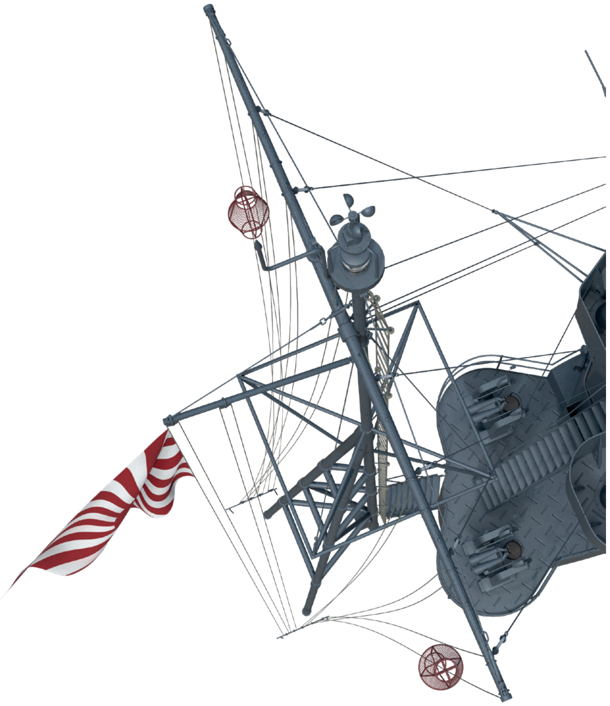


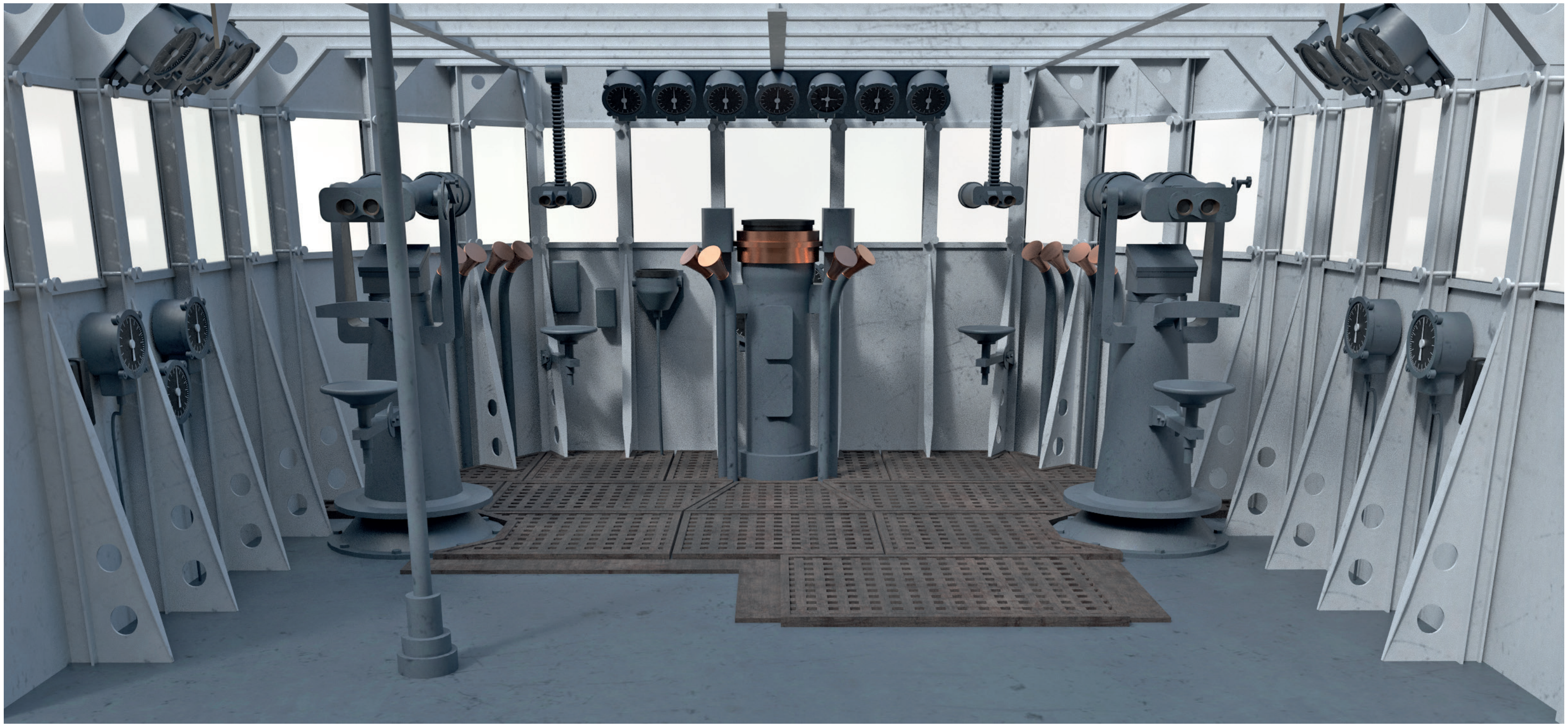
C1/21











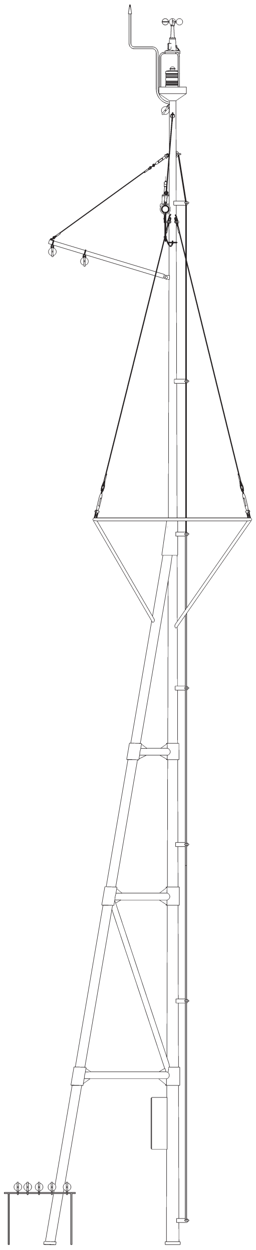
MAST (1/100 SCALE)

C1/22 RIGHT PROFILE

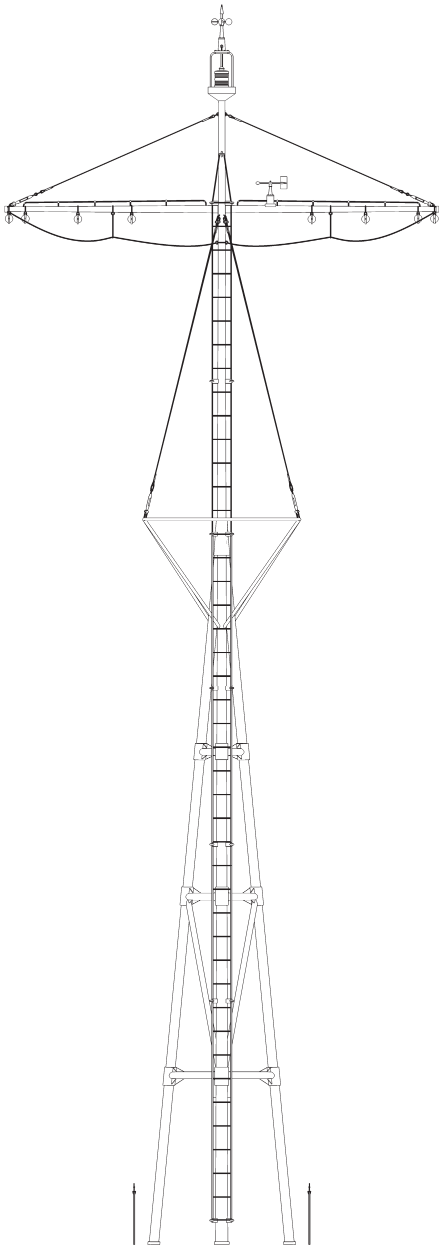
C1/23 FRONT VIEW

C1/24 FRONT VIEW WITH FULL RIGGING

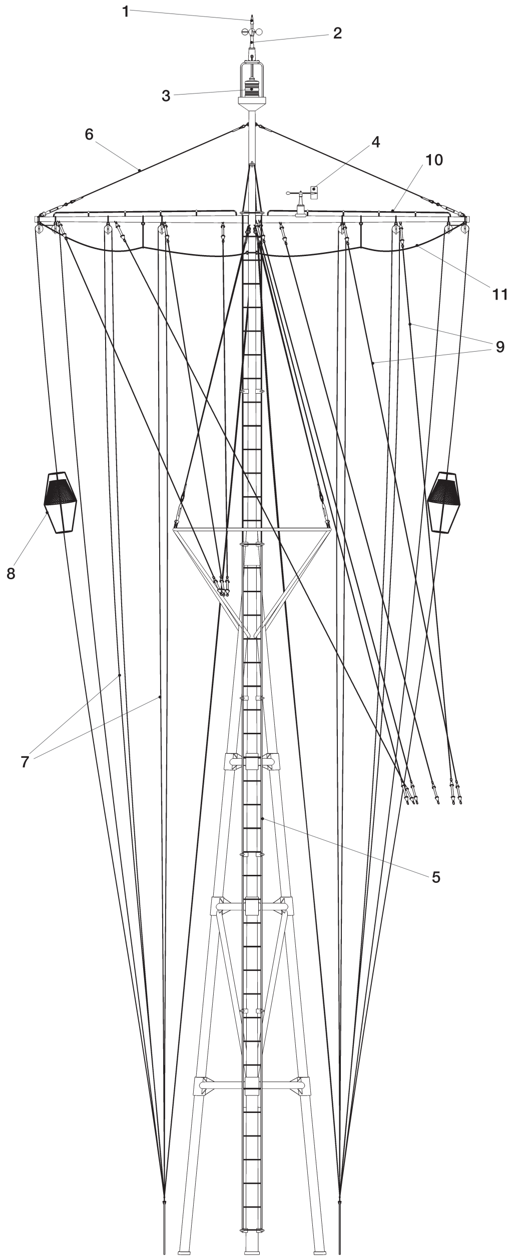
1 Lightning rod
2 Wind strength transmitter
3 Head light
4 Wind direction indicator
5 Jacob's ladder
6 Stay
7 Flag halyard
8 Speed signalling mark
9 Wire antenna (to superstructure outrigger)
10 Handrail
11 Foot step



C1/22



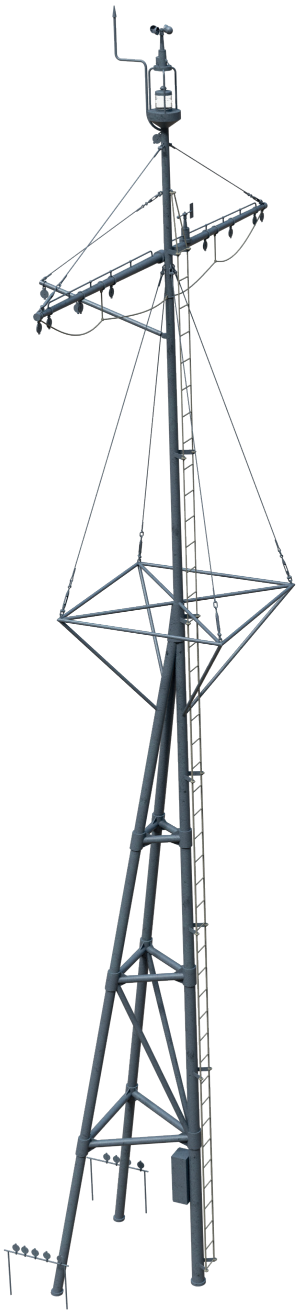
C1/23

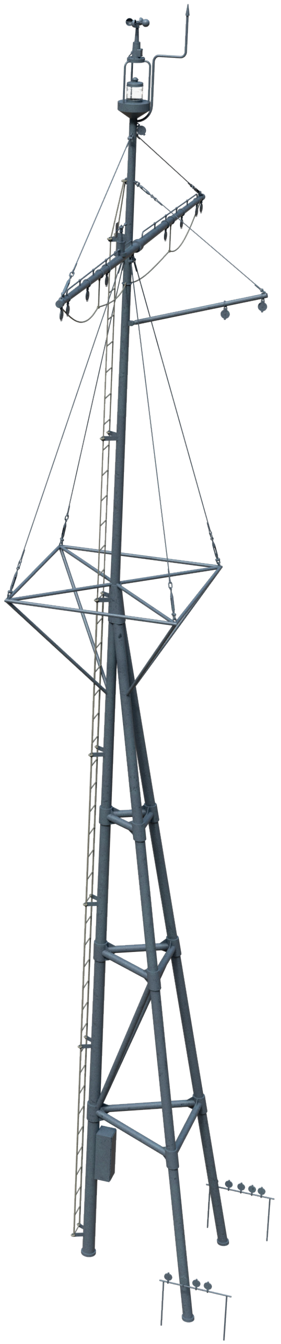


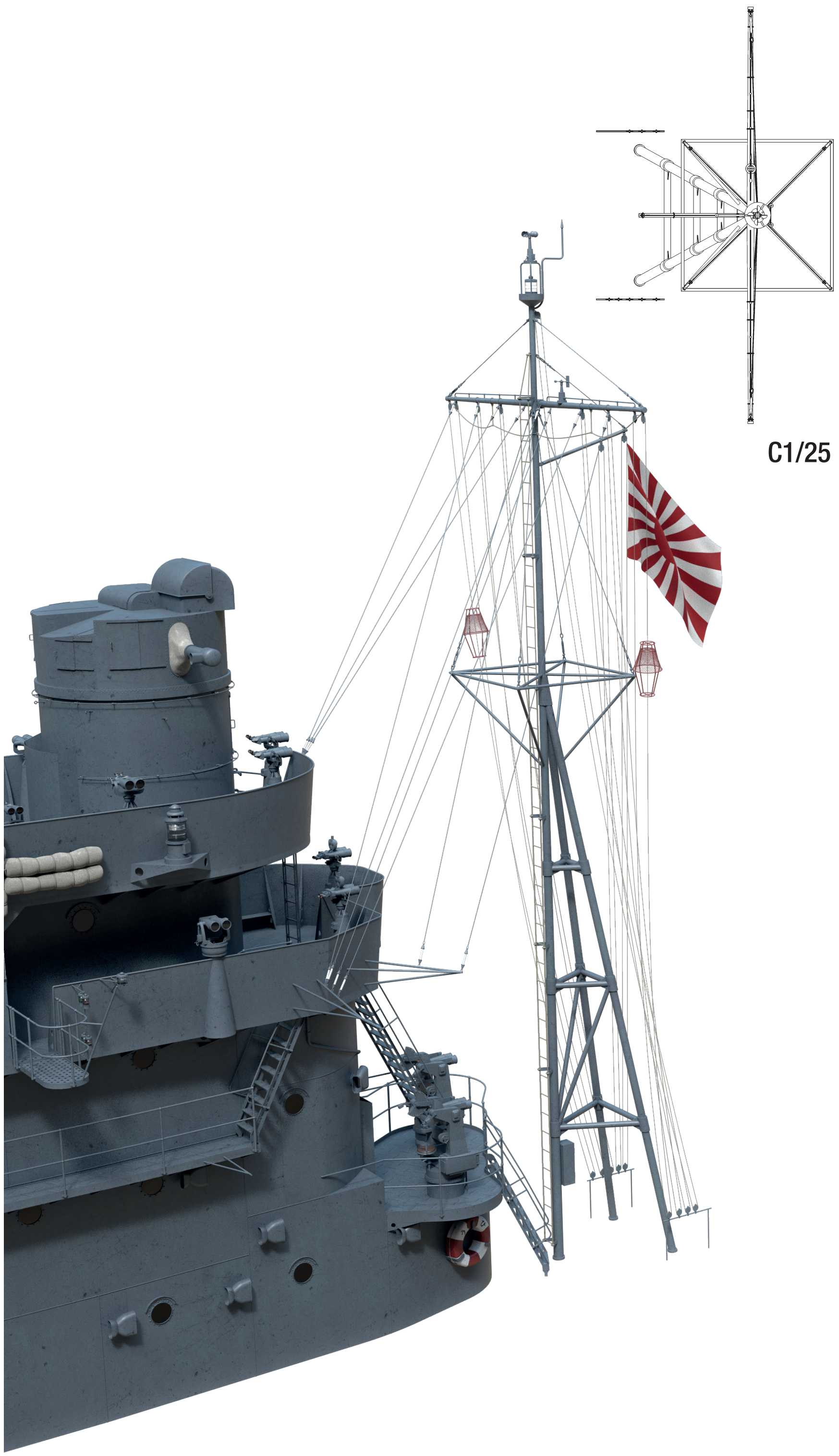
C1/24

MAST (1/100 SCALE)

C1/25 PLAN



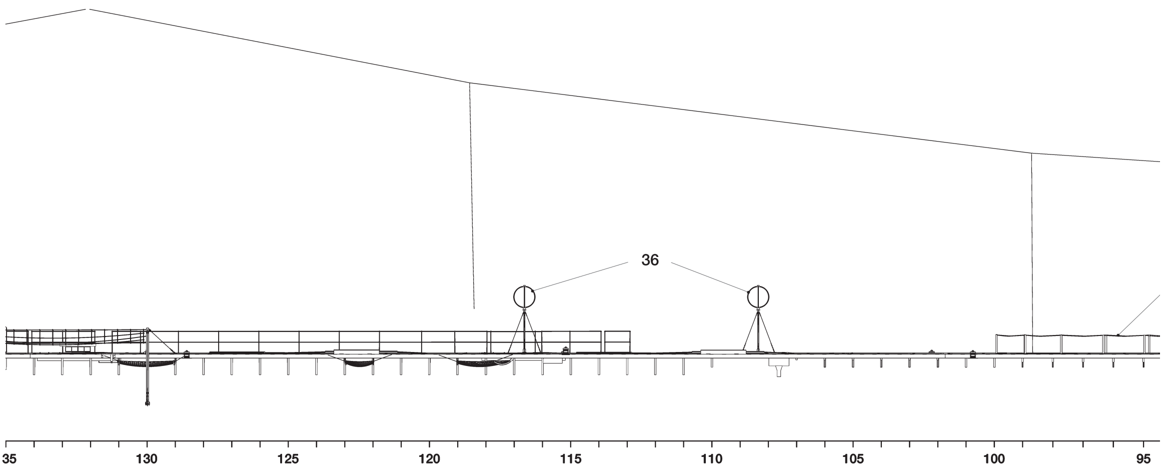


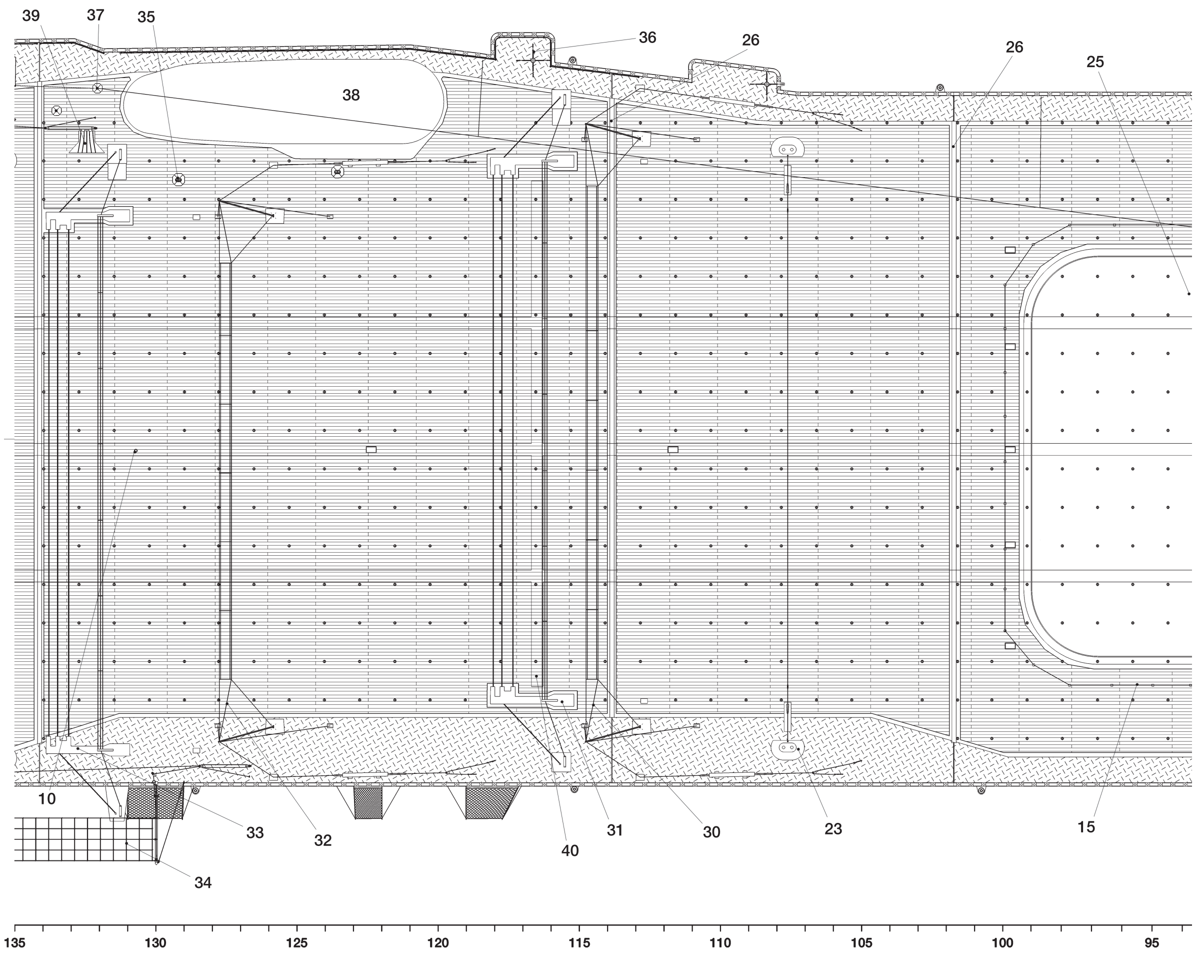


FLIGHT DECK, FRAMES 8–135 (1/300 SCALE)

D1/1 RIGHT PROFILE

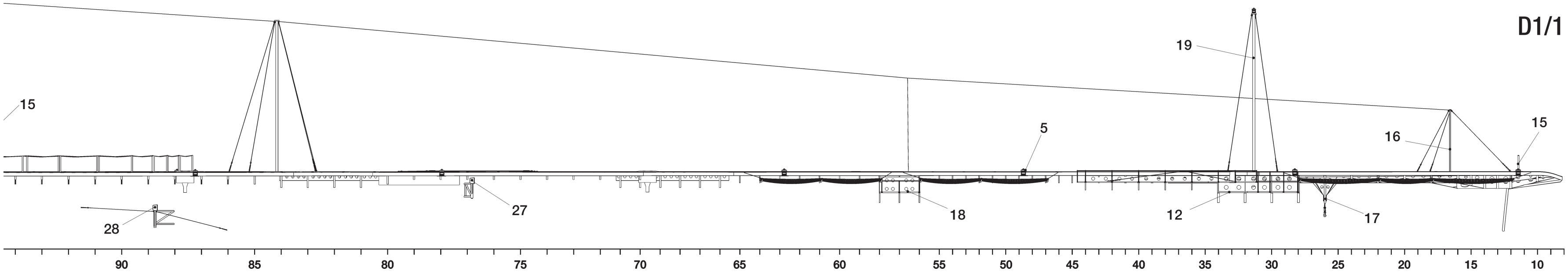
D1/2 PLAN



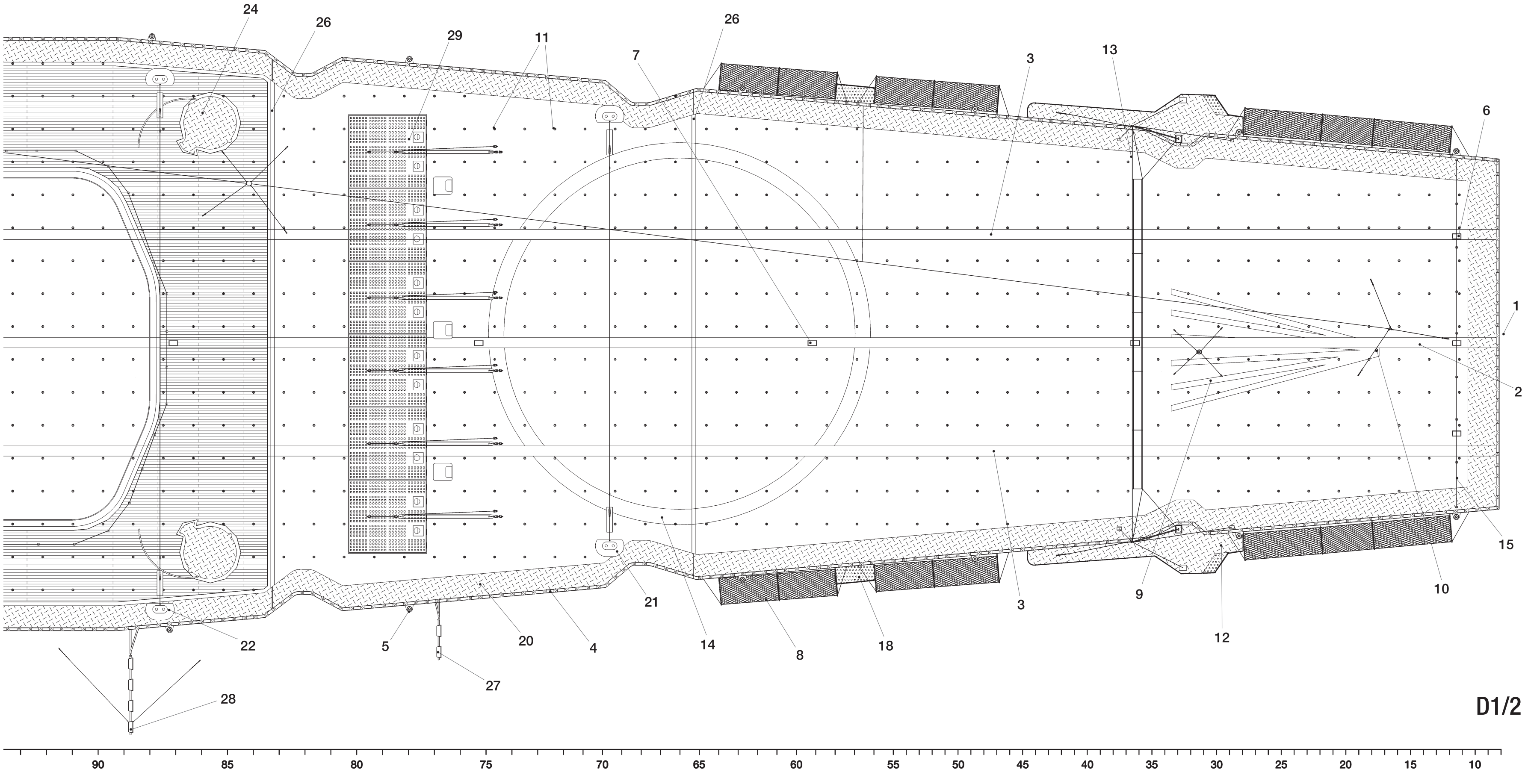


D1/1–3 FLIGHT DECK, FRAMES 8–135

1 Hull centreline
2 White painted flight deck centreline (offset to starboard by around 0.5m)
3 White painted flight deck side line
4 Flight deck gutter
5 Flight deck side indication light (white)
6 Flight deck front indication light (white)
7 Flight deck centreline indication light (white)
8 Crew safety net
9 White painted wind direction indicator
10 Steam generator for wind direction indicator
11 Aircraft locking eye plate
12 Crew waiting platform
13 Crash barrier no. 1 (portable type)
14 Air recognition *Hinomaru* (red circle with white outline; painted shortly before the Midway operation)
15 Folding guard rail (rigged only in harbour)
16 Support for dressing lines (rigged only on special occasions)
17 Overhead crane for loading of ammunition and supplies
18 Aviation gasoline pumping platform
19 Small mast with position light (rigged only in harbour)
20 Side walkway (chequer plate)
21 Arrester gear no. 1
22 Arrester gear no. 2
23 Arrester gear no. 3
24 110cm searchlight well cover
25 Aircraft elevator no. 1
26 Expansion joint
27 Landing-aid light system – red array (adjustable height)
28 Landing-aid light system – green array (fixed height)
29 Windscreen
30 Crash barrier no. 2 (portable type)
31 Crash barrier no. 3 (fixed type)
32 Crash barrier no. 4 (portable type)
33 Crash barrier no. 5 (fixed type)
34 Aircraft safety net
35 Scupper
36 Direction finder loop antenna
37 Mast base
38 Superstructure base
39 Deck illumination light
40 White painted stop line



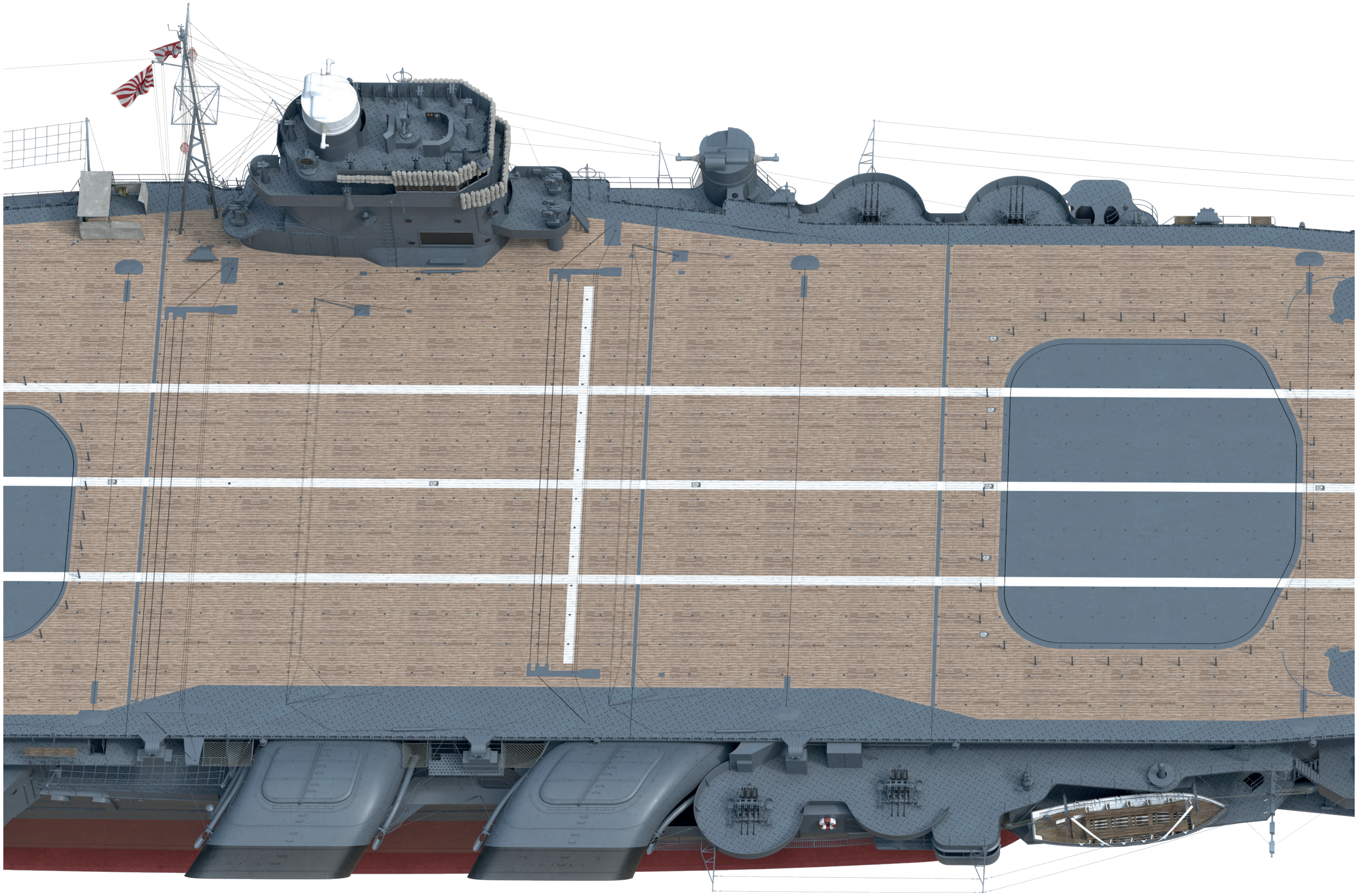
D1/1

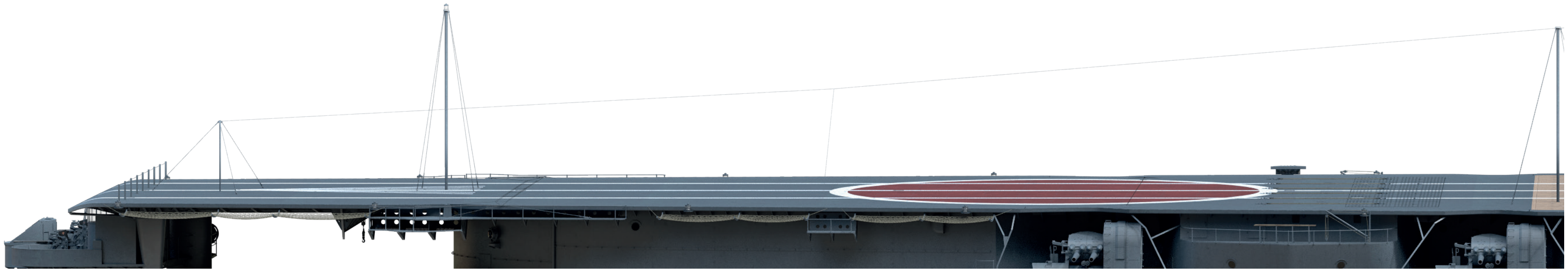


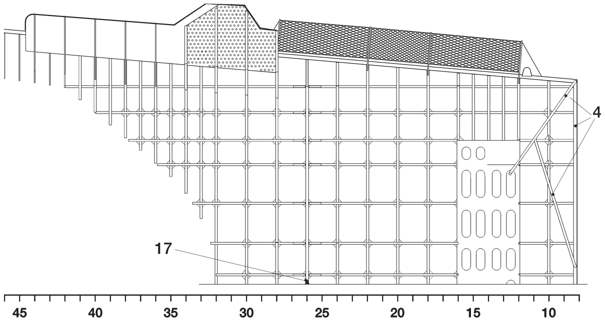
D1/2

FLIGHT DECK, FRAMES 8–135 (1/300 SCALE)

D1/3 UNDERSIDE (STARBOARD SIDE FRAGMENT)



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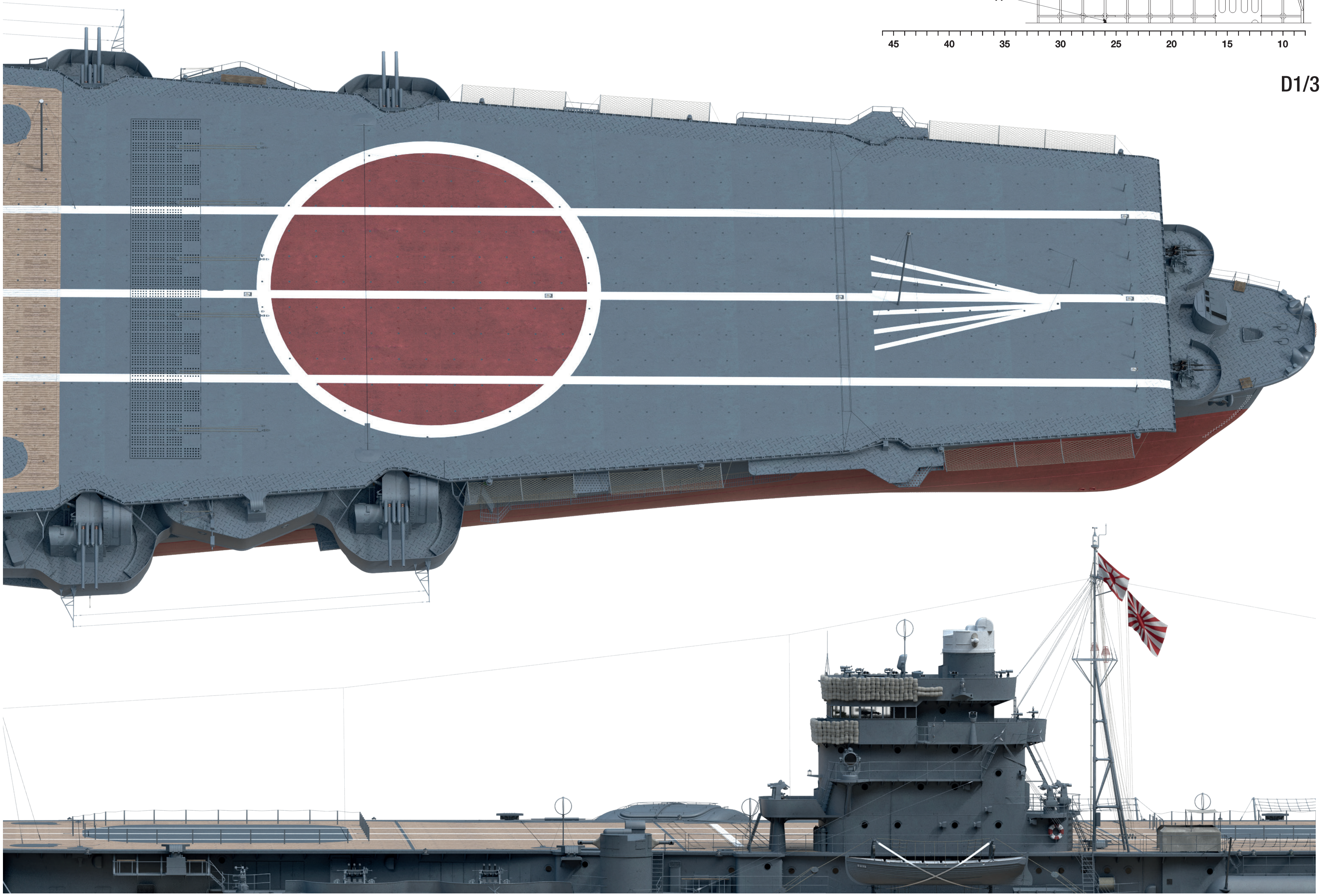
D1/3



FLIGHT DECK, FRAMES 135–261 (1/300 SCALE)

D1/4 RIGHT PROFILE

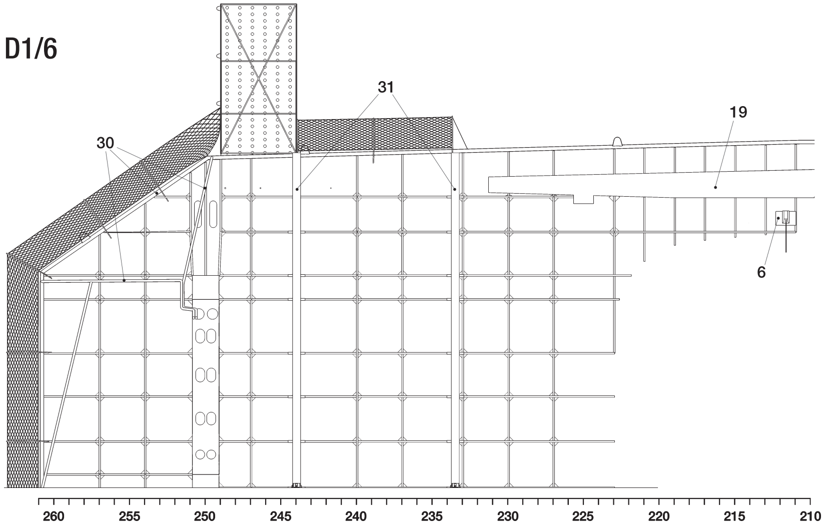
D1/5 PLAN

D1/6 UNDERSIDE (STARBOARD SIDE FRAGMENT)

D1/4–6 FLIGHT DECK, FRAMES 135–261

1 Arrester gear no. 4
2 Arrester gear no. 5
3 Arrester gear no. 6
4 Arrester gear no. 7
5 Arrester gear no. 8
6 Arrester gear no. 9
7 Folding guard rail (rigged only in harbour)
8 Expansion joint
9 Aircraft safety net
10 Aircraft elevator no. 2
11 Aircraft elevator no. 3
12 Canvas-covered signal flag rack
13 Loading derrick (rigged only in harbour)
14 Wind speed signal light (green)
15 Wind speed signal light (red)
16 Wind speed signal light (white)
17 110cm searchlight well cover
18 4-ton aircraft crane well cover
19 4-ton aircraft crane well
20 Crew safety net
21 Dressing line (to starboard side wire antenna masts; rigged only on special occasions)
22 Landing-aid light system – red array (adjustable height)
23 Landing-aid light system – green array (fixed height)
24 Landing-aid light system – white light for signalling messages
25 White painted character HI (ヒ) from katakana syllabary – Hiryu's identification mark
26 Rear portion of flight deck painted in red and white stripes indicating the not-touch area for landing aircraft
27 Flight deck wing (landing sign indicating the rear of the flight deck)
28 Wing light (red)
29 Flight deck rear indication light (red)

D1/6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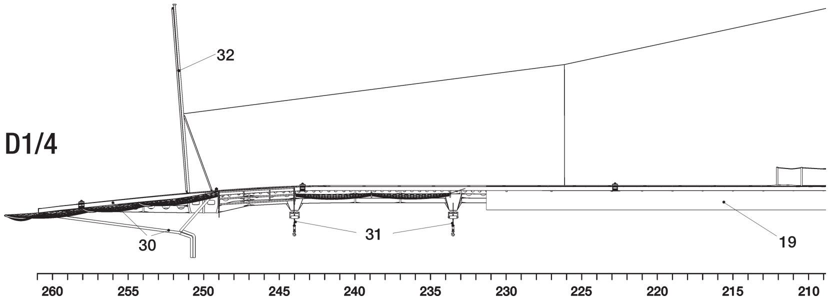
D1/4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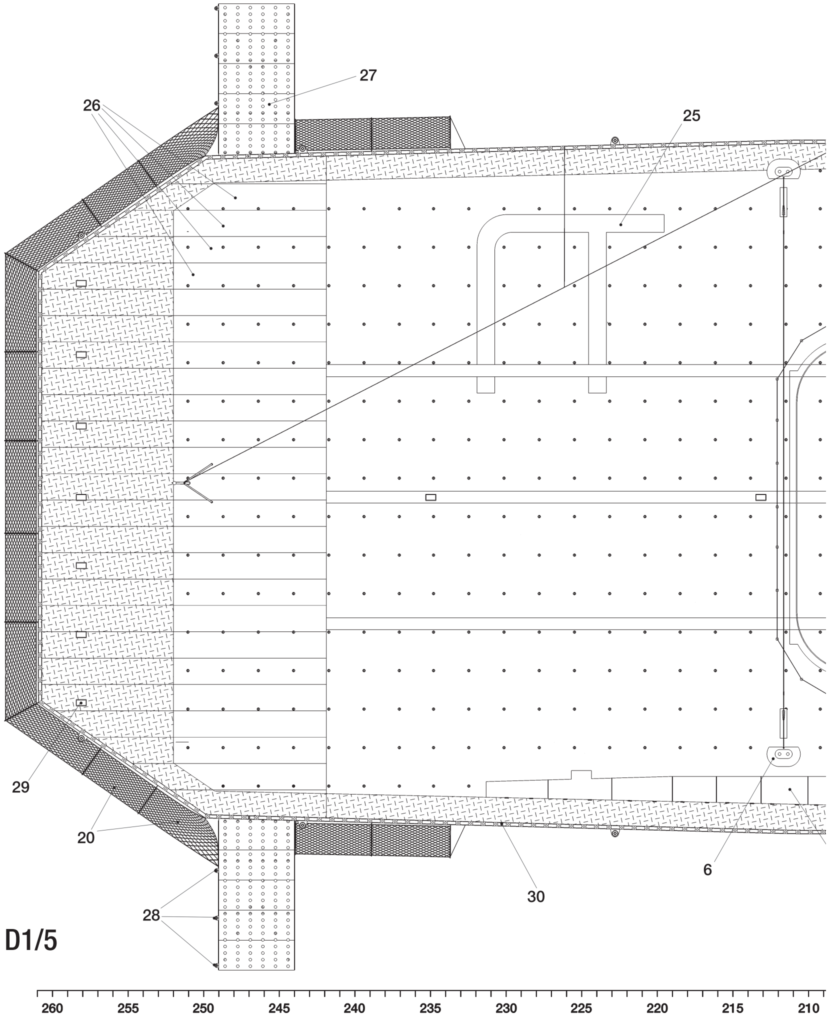
D1/5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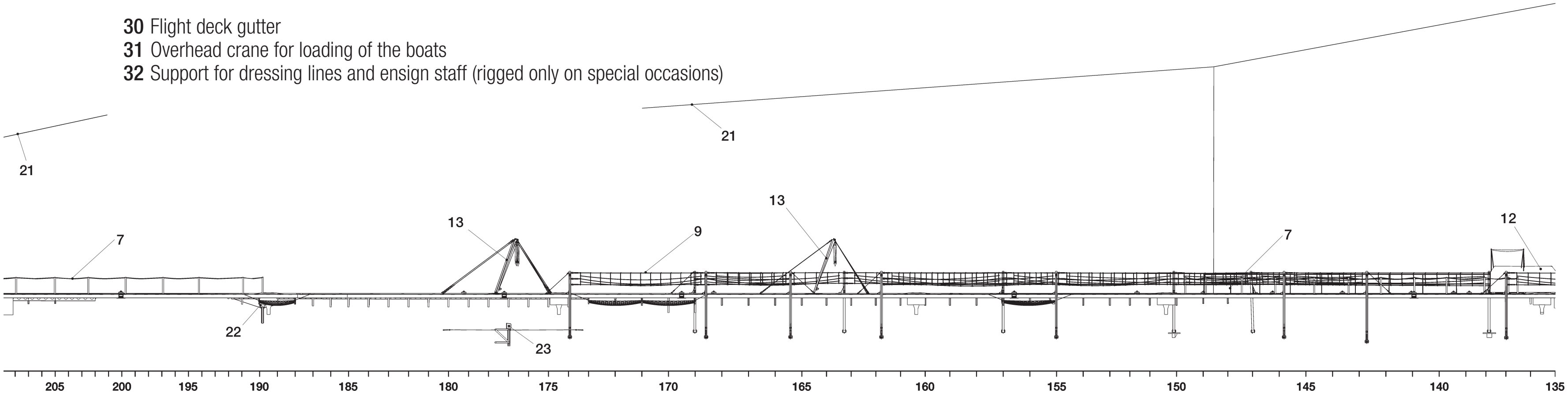
30 Flight deck gutter
31 Overhead crane for loading of the boats
32 Support for dressing lines and ensign staff (rigged only on special occasions)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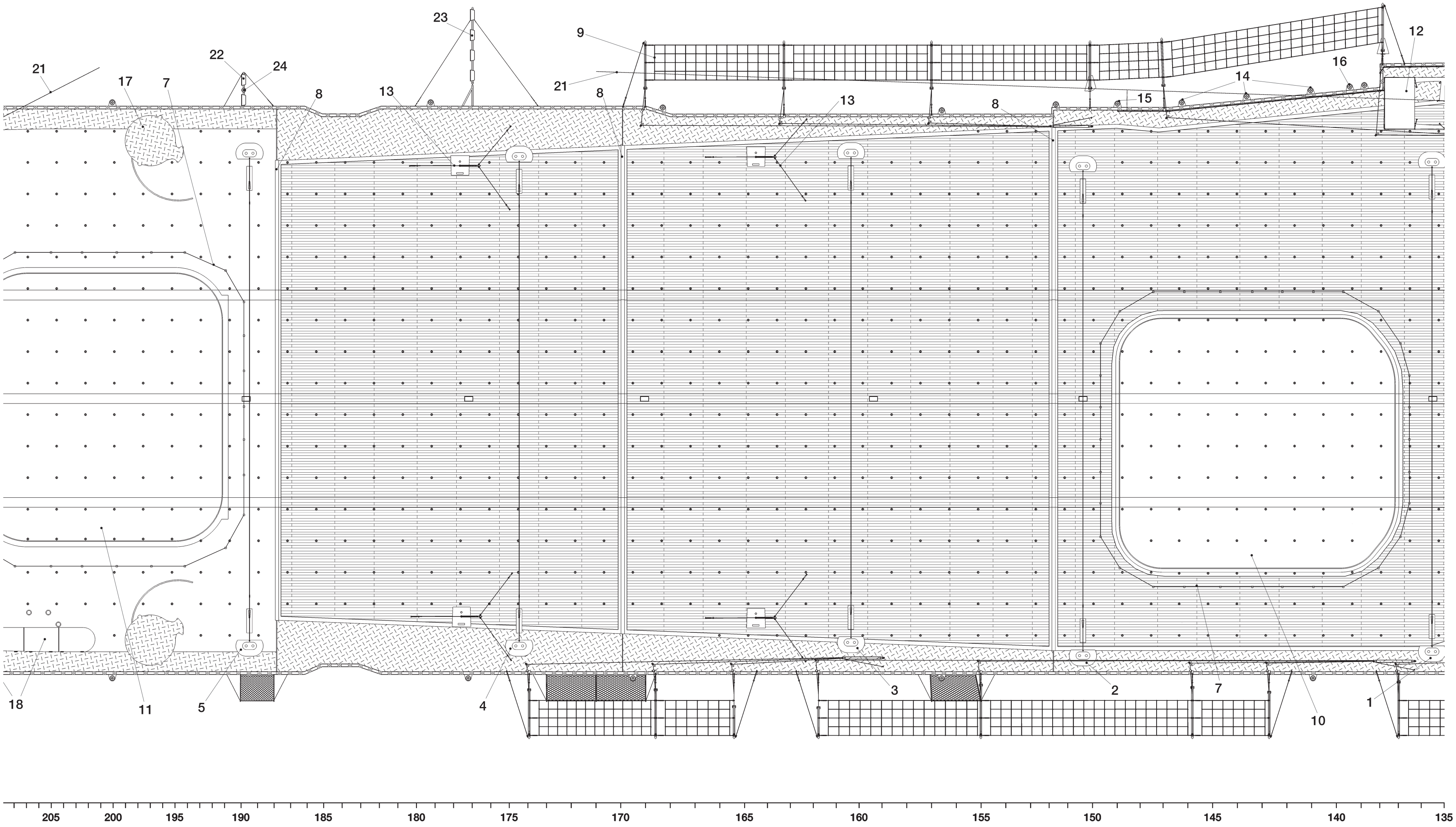
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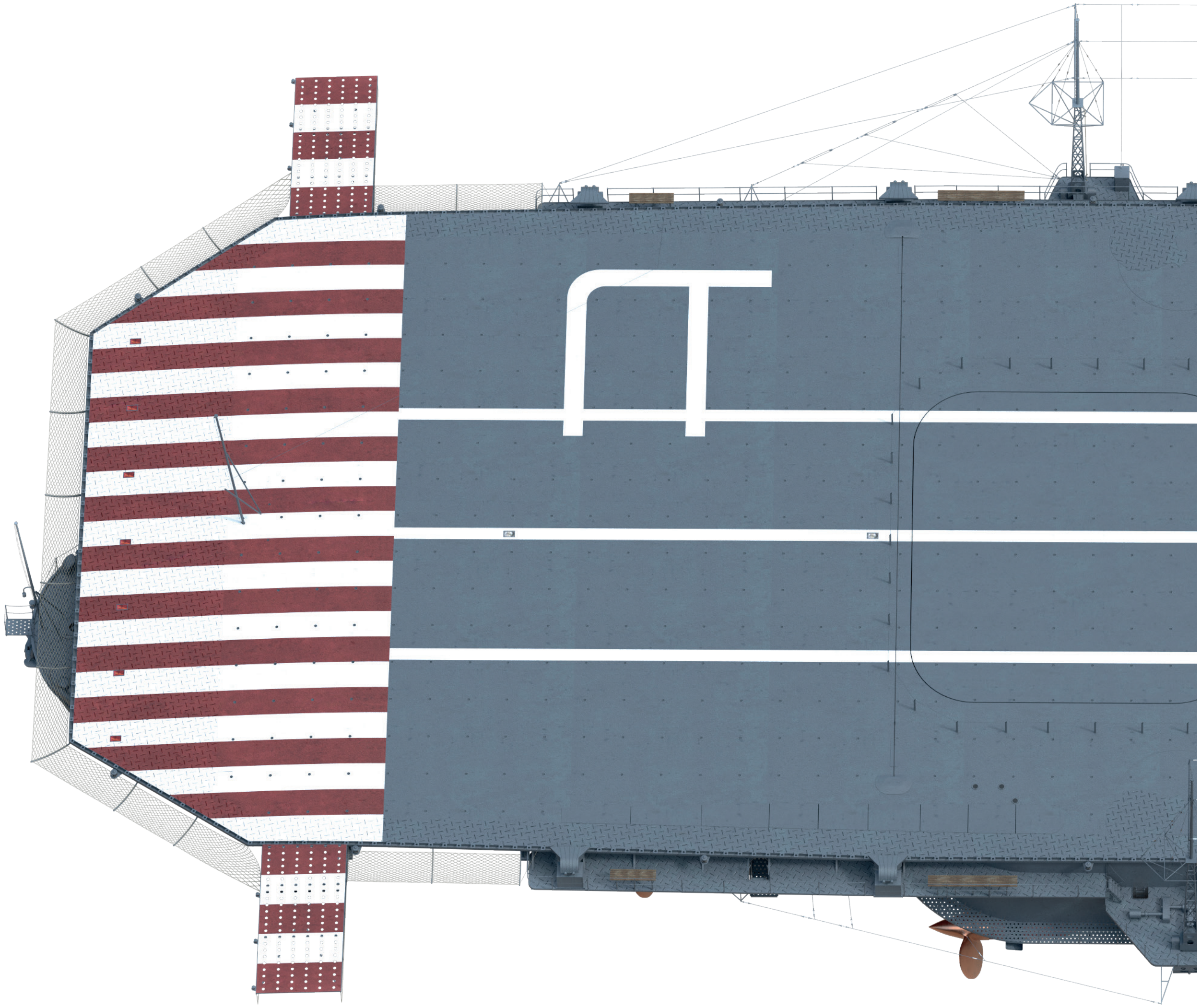
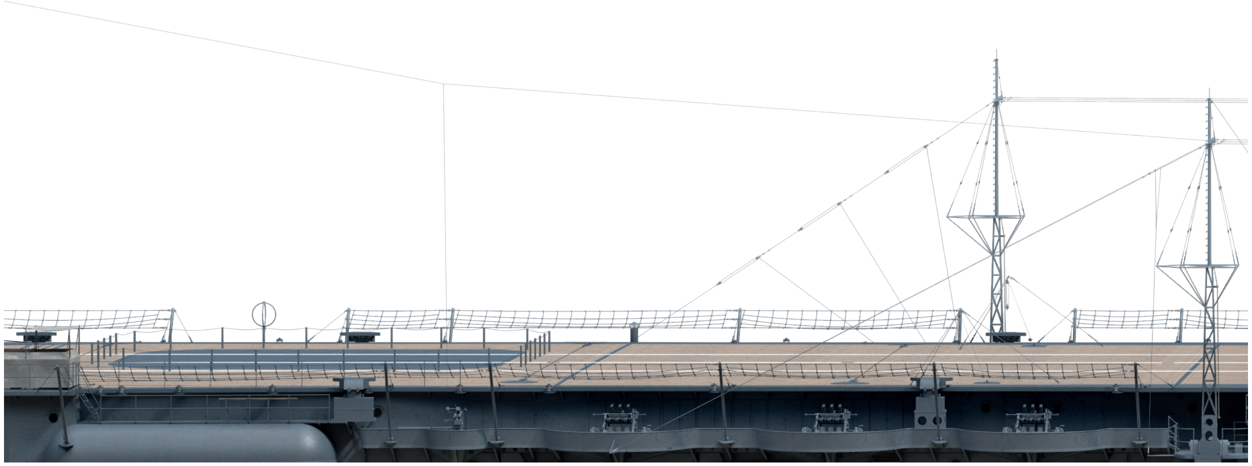
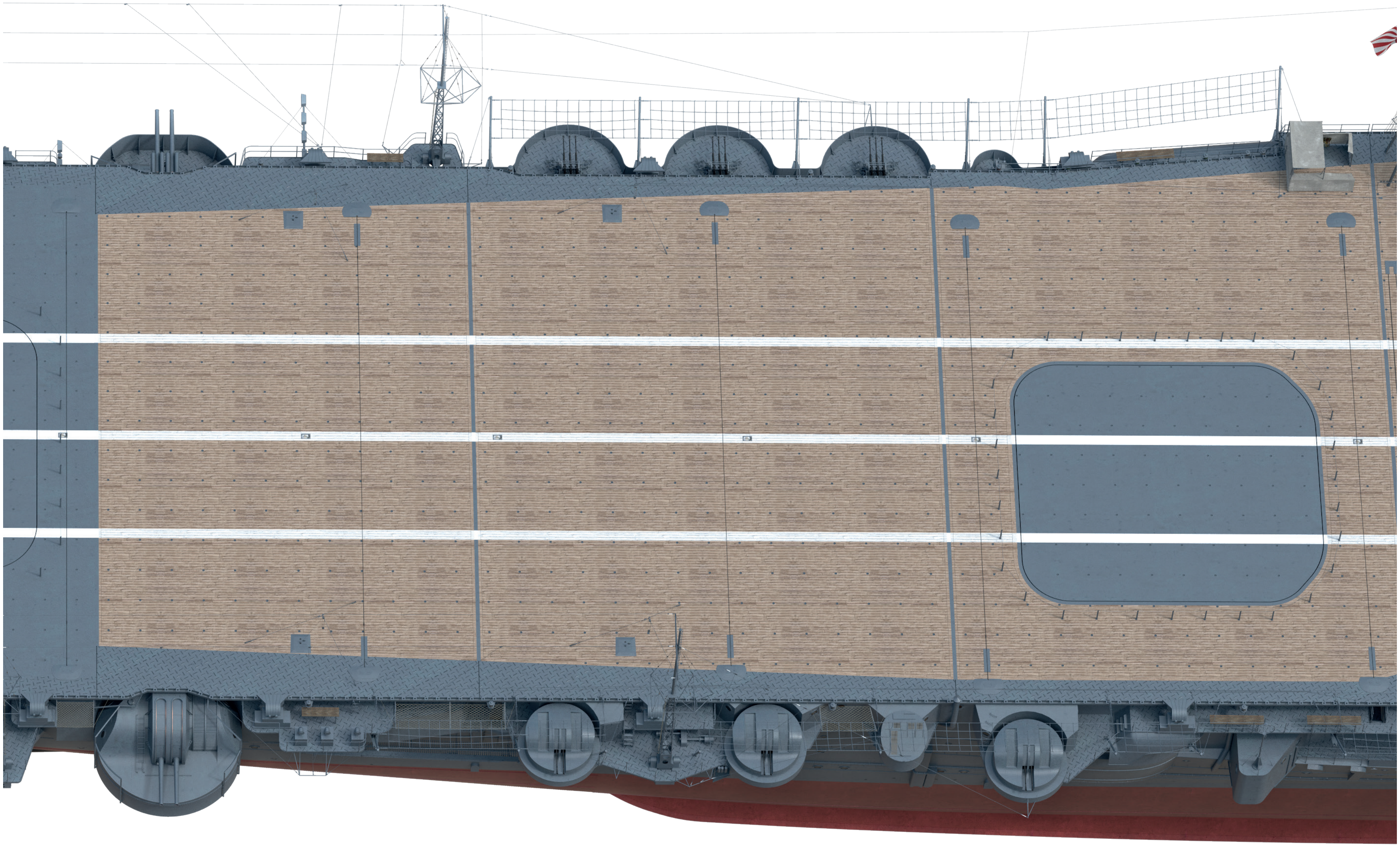
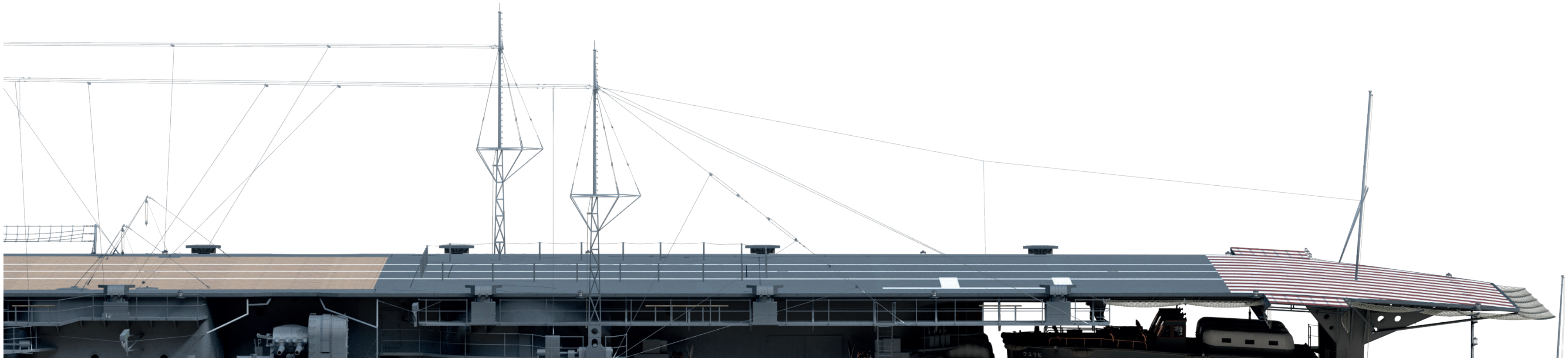
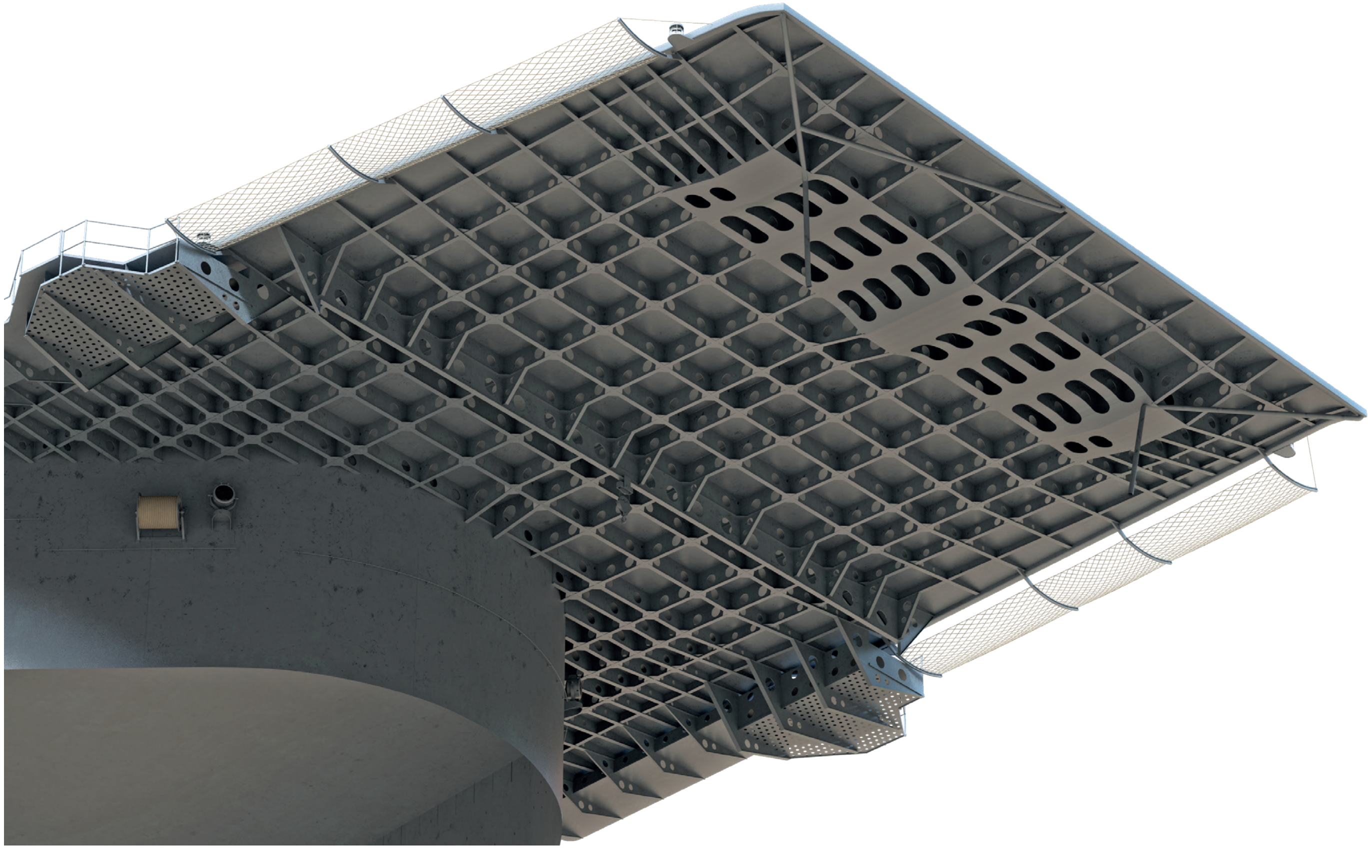
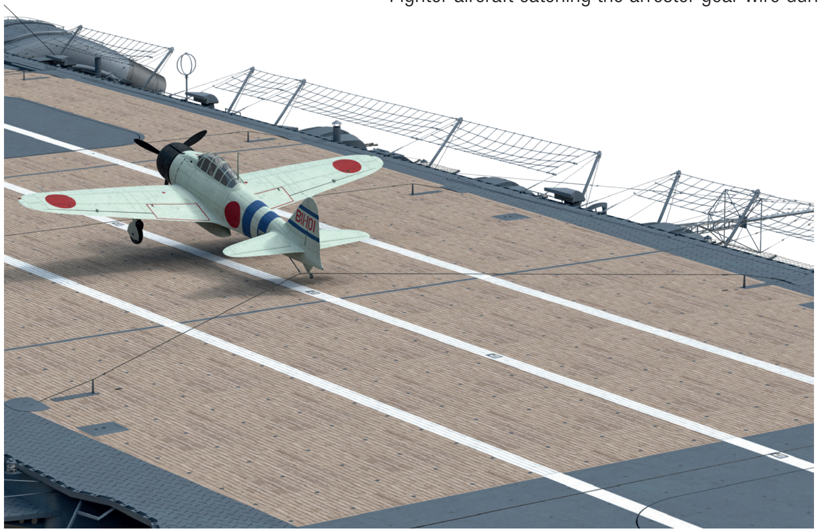


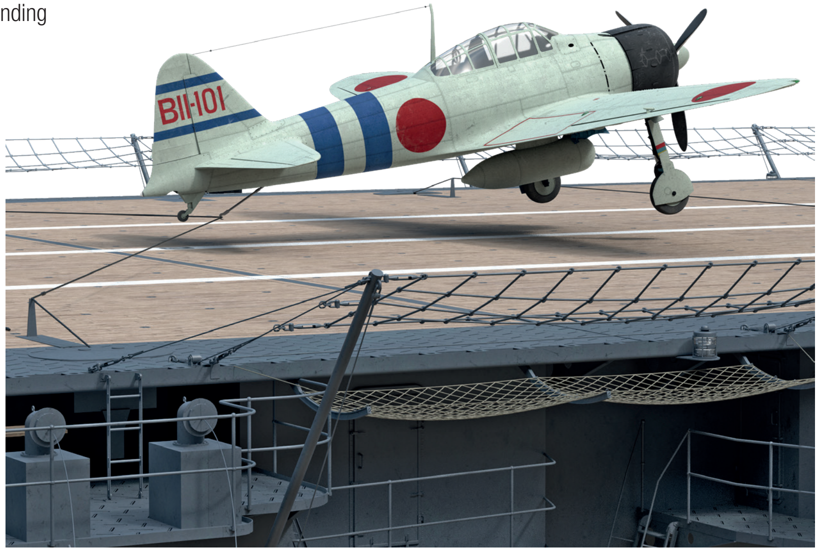




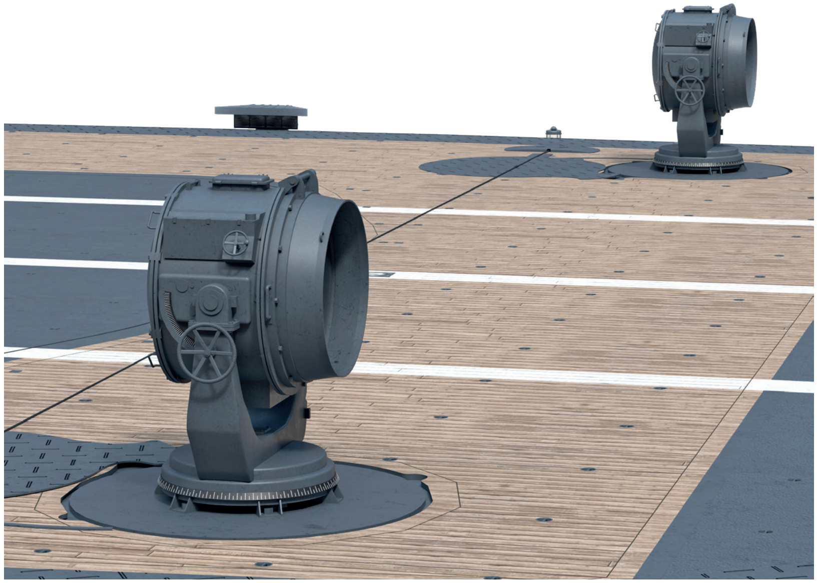


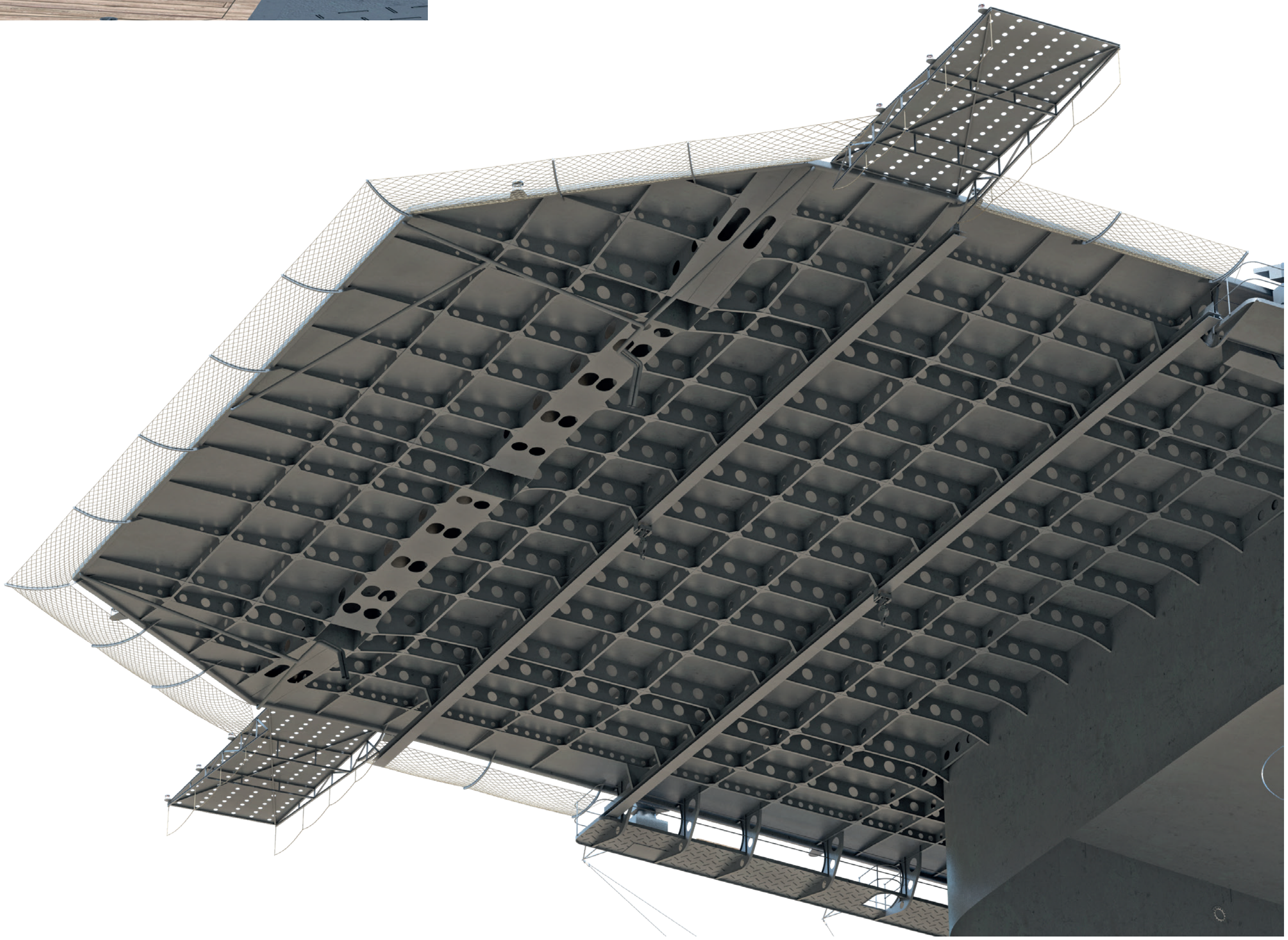






Fighter aircraft catching the arrester gear wire during landing

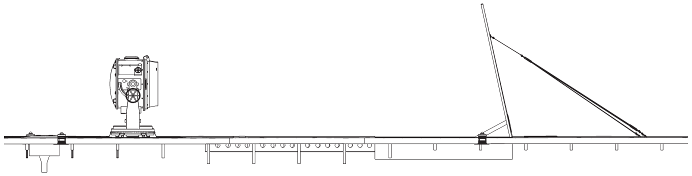




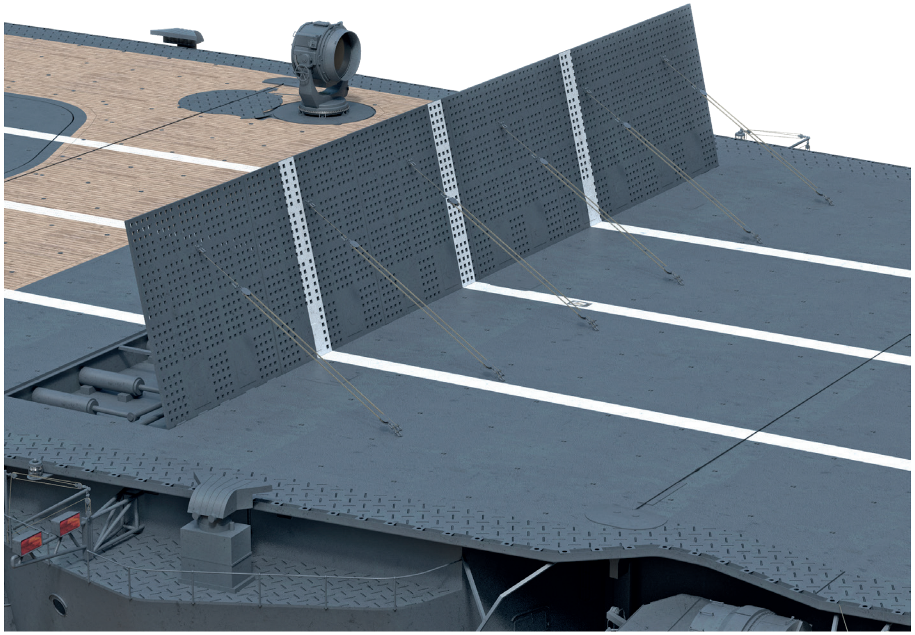
RIGGED WINDSHIELD AND FORE 110CM SEARCHLIGHTS IN THEIR WORKING POSITIONS (1/200 SCALE)

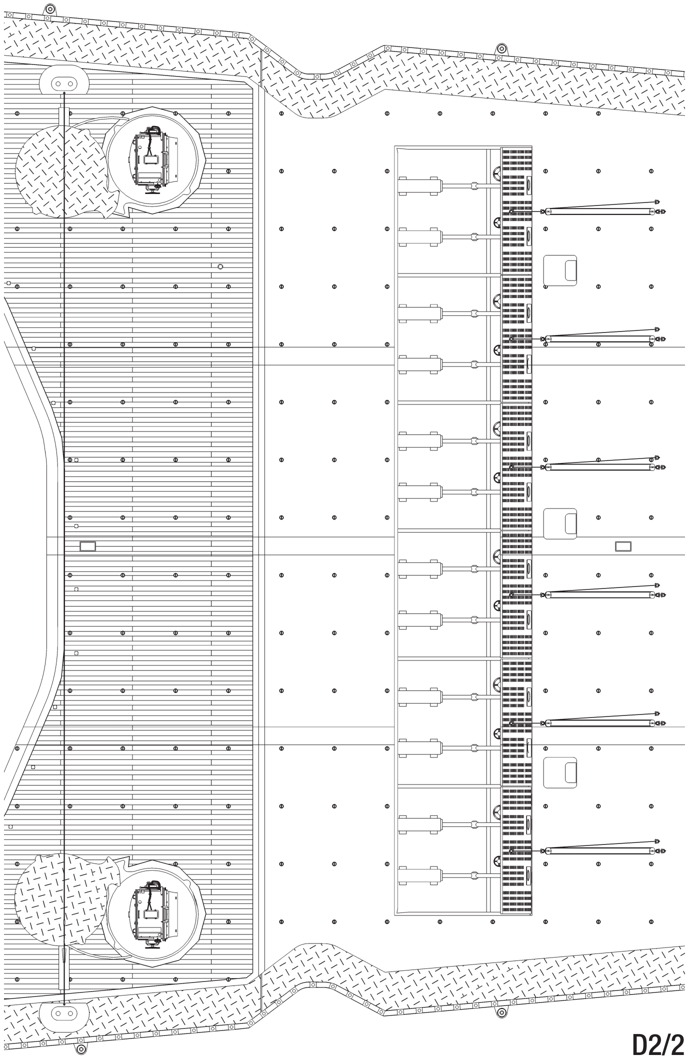
D2/1 RIGHT PROFILE

D2/2 PLAN

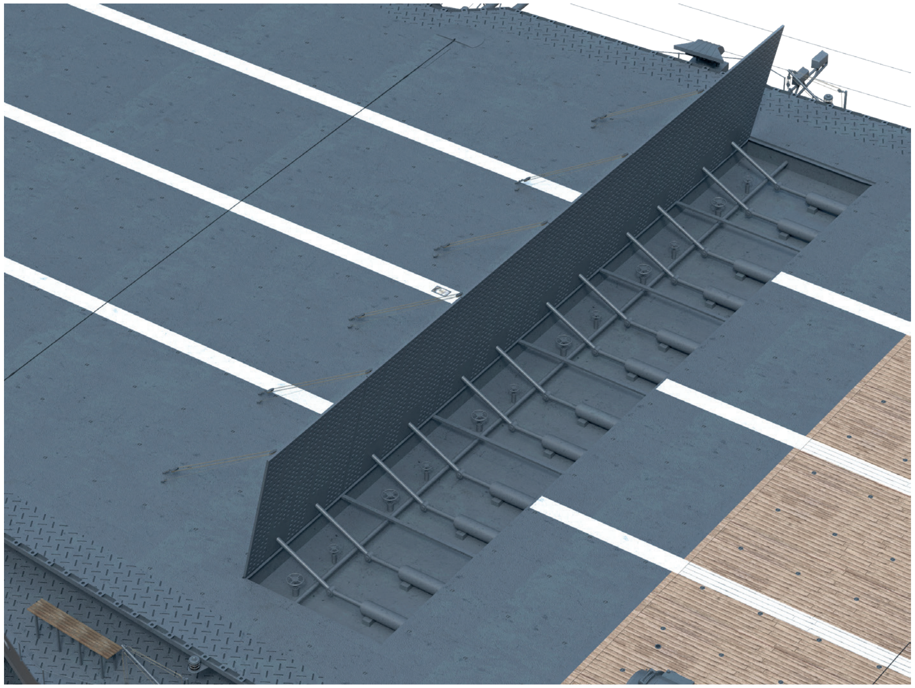


D2/1



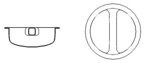


D2/2



AIRCRAFT LOCKING EYE PLATE (1/15 SCALE)

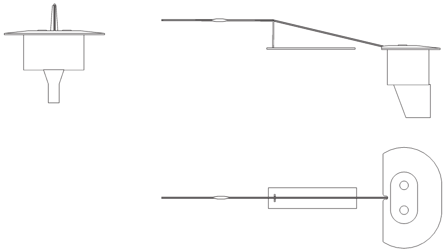
D2/3 INTERNAL PROFILE AND PLAN



D2/3

ARRESTER GEAR RIGGED FOR LANDING OPERATION (1/100 SCALE)

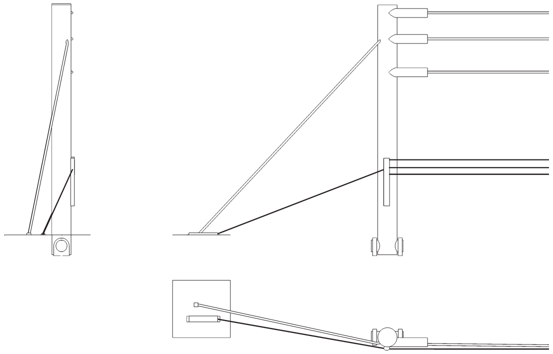
D2/4 PROFILE, BACK VIEW AND PLAN (FRAGMENTS)



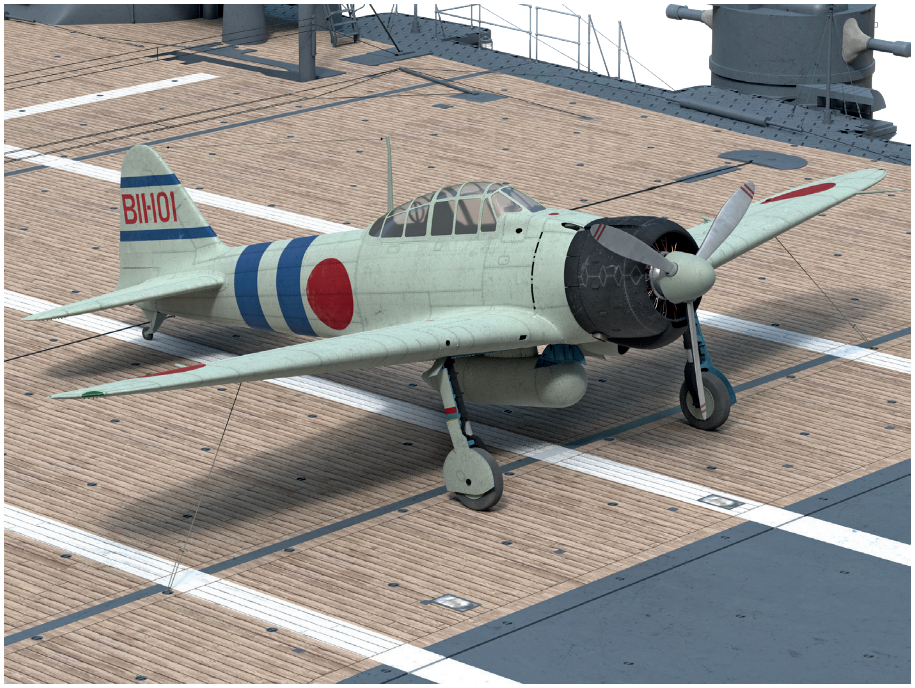
D2/4

RIGGED CRASH BARRIER (1/100 SCALE)

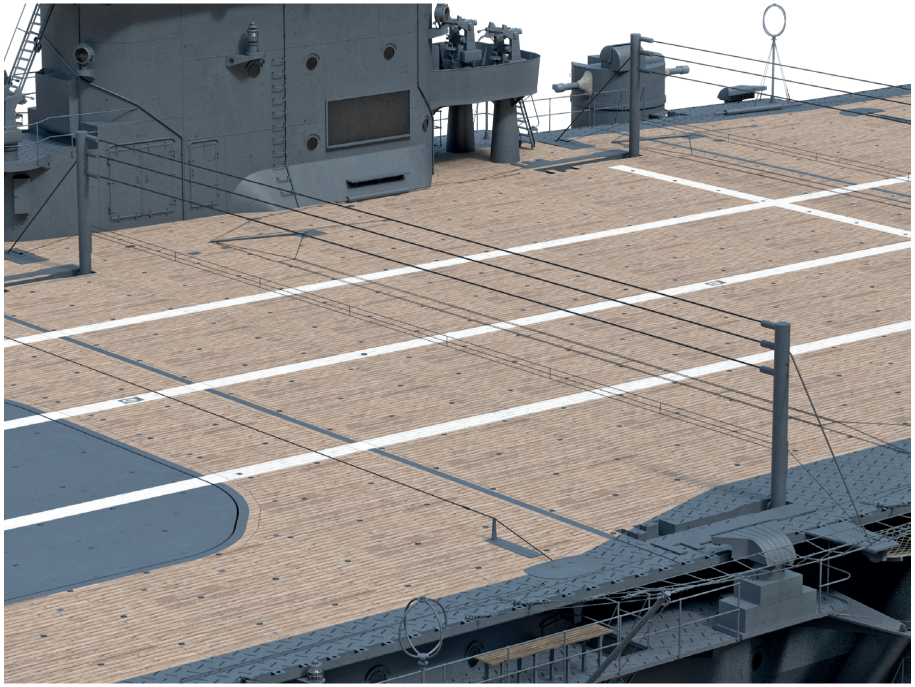
D2/5 PROFILE, FRONT VIEW AND PLAN (FRAGMENTS)



D2/5

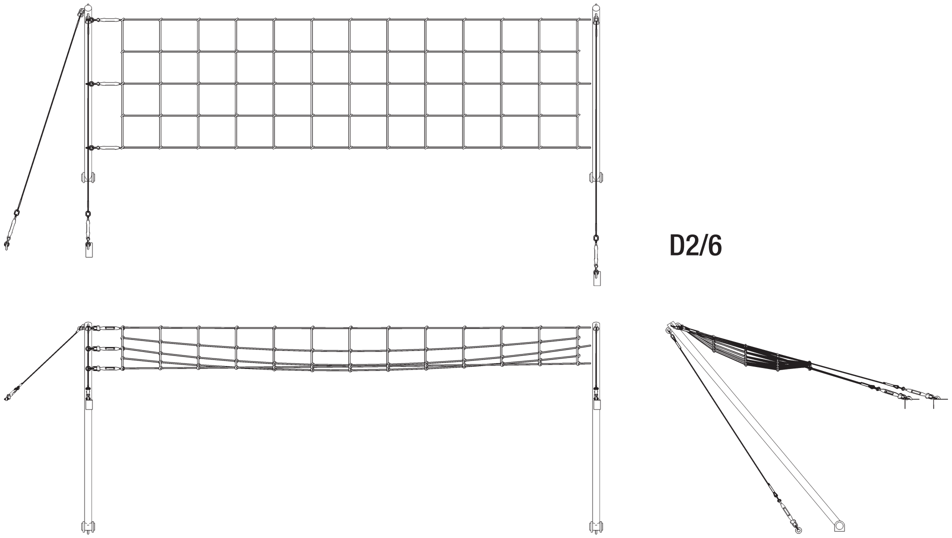


Fighter aircraft secured to the locking eye plates in the deck

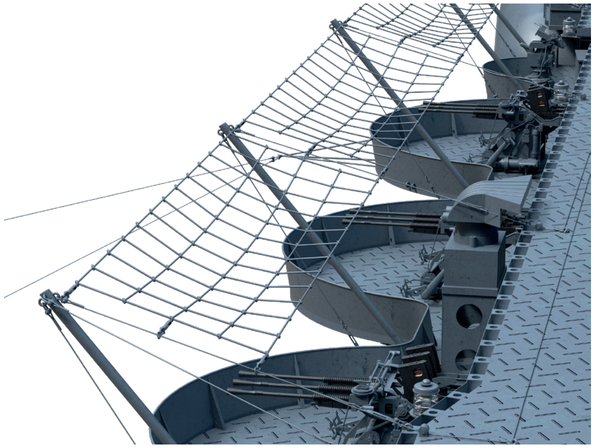


AIRCRAFT SAFETY NET (1/100 SCALE)

D2/6 PROFILE, BACK VIEW AND PLAN (FRAGMENTS)

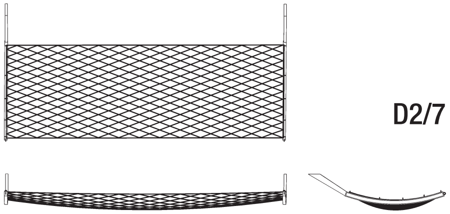


D2/6

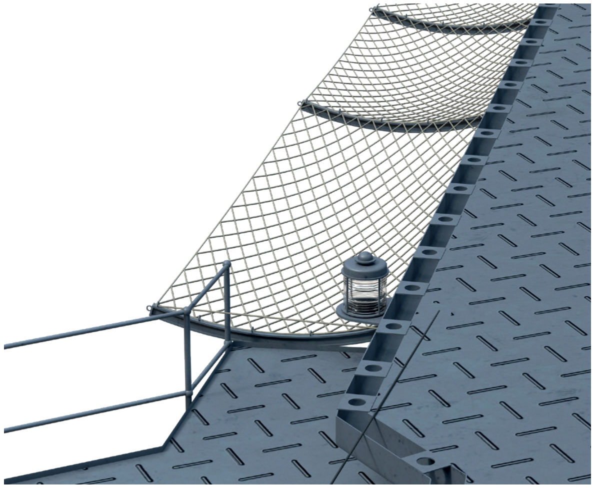


CREW SAFETY NET (1/100 SCALE)

D2/7 PROFILE, BACK VIEW AND PLAN (FRAGMENTS)



D2/7

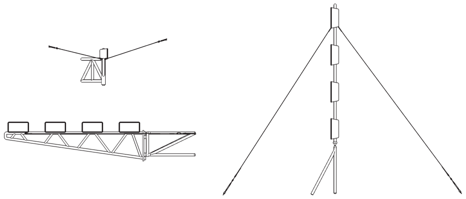


LANDING-AID LIGHT SYSTEM – RED ARRAY (1/100 SCALE)

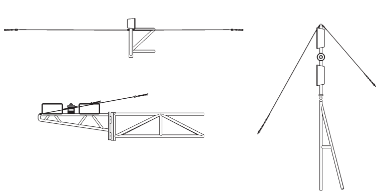
D2/8 PROFILE, BACK VIEW AND PLAN

LANDING-AID LIGHT SYSTEM – GREEN ARRAY (1/100 SCALE)

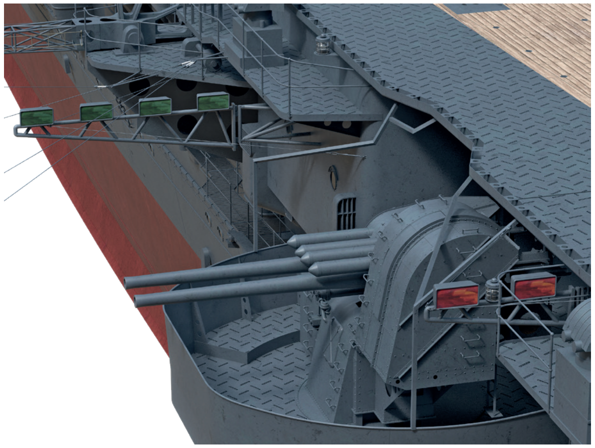
D2/9 PROFILE, BACK VIEW AND PLAN



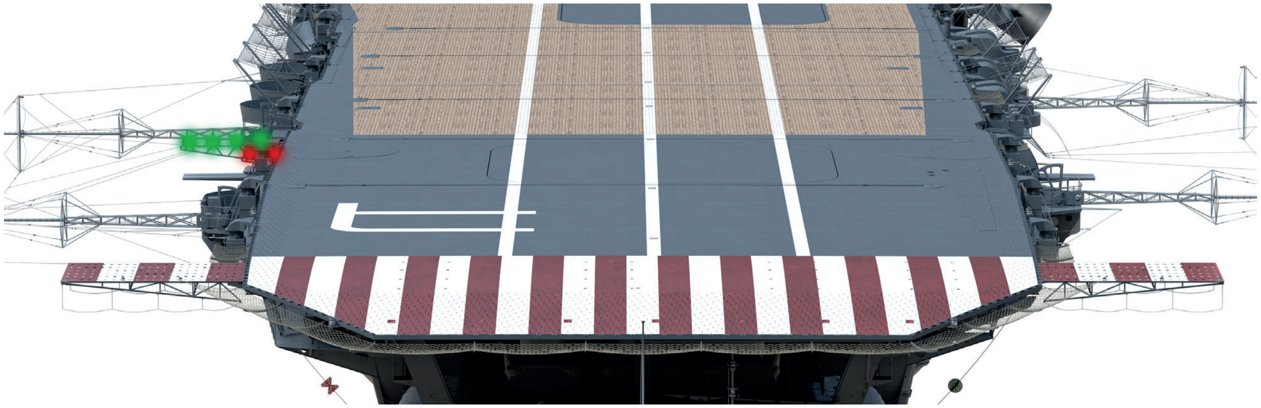
D2/8



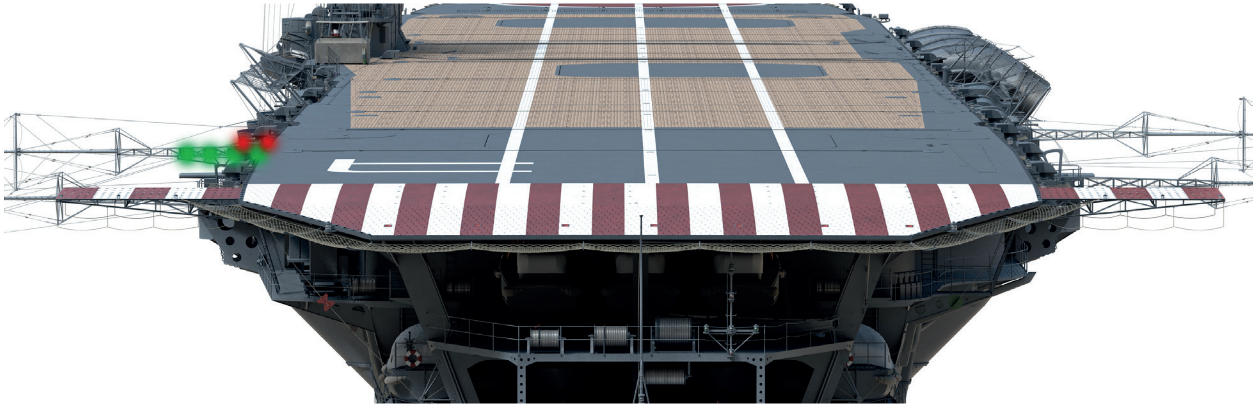
D2/9



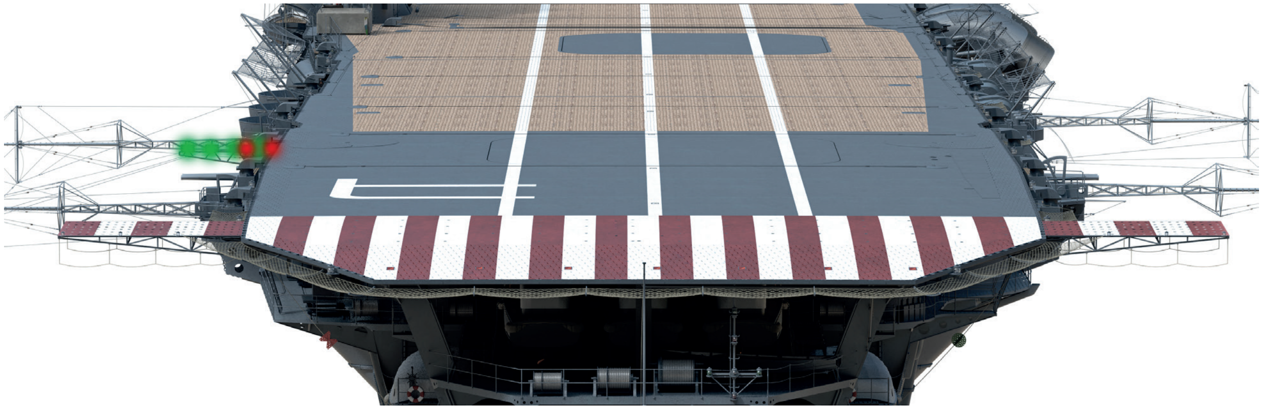
OPERATION OF THE LANDING-AID LIGHT SYSTEM FROM THE PILOT'S PERSPECTIVE



Green array observed above the red array, indicating that the aircraft's path is too high



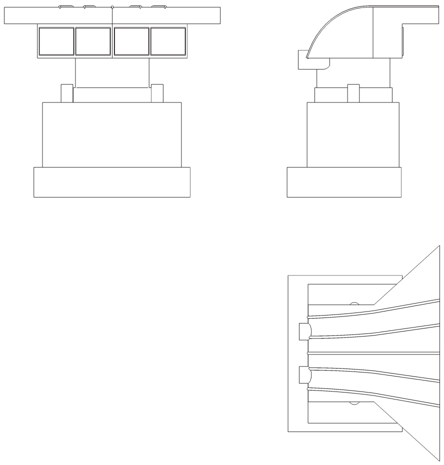
Red array observed above the green array, indicating that the aircraft's path is too low



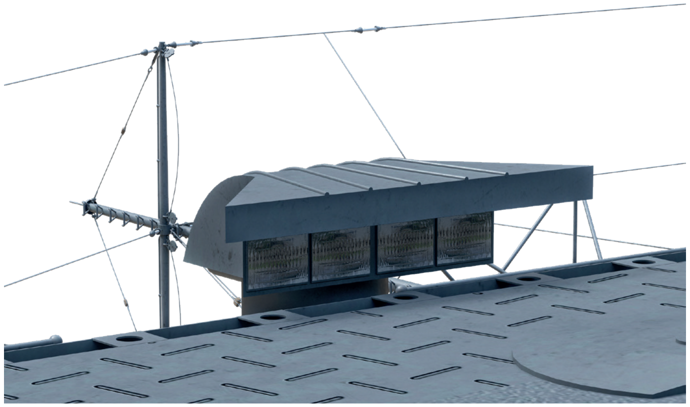
Red array and green array observed at the same level, indicating that the aircraft's path is correct

DECK ILLUMINATION LIGHT (1/50 SCALE)

D2/10 PROFILE, BACK VIEW AND PLAN

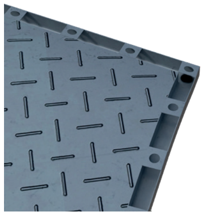


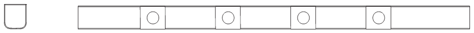
D2/10



GUTTER DETAIL (1/50 SCALE)

D2/11 BACK VIEW AND PLAN (FRAGMENTS)





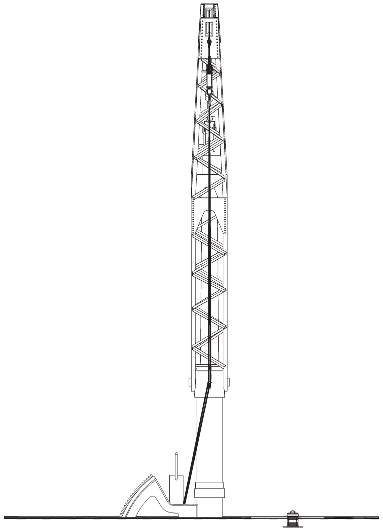
D2/11

4-TON AIRCRAFT CRANE IN ITS RIGGED POSITION (1/150 SCALE)

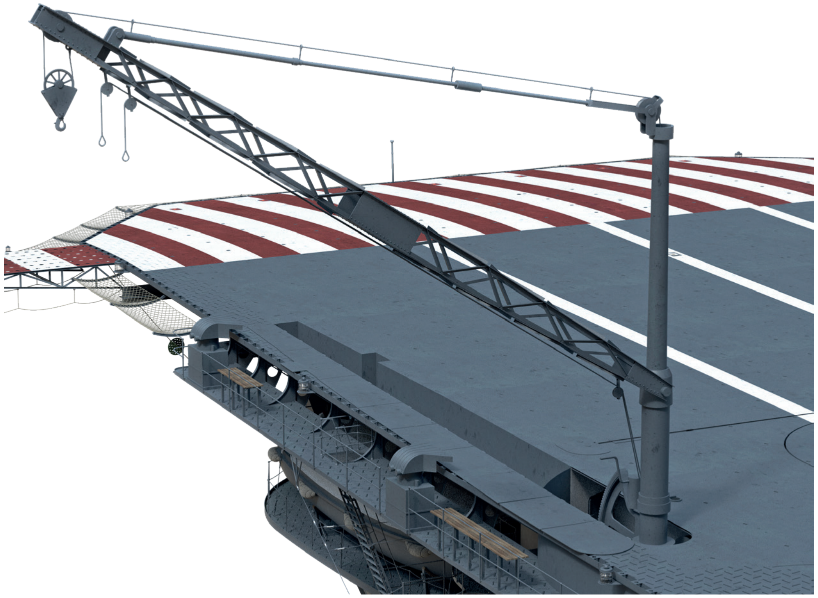
D2/12 PROFILE

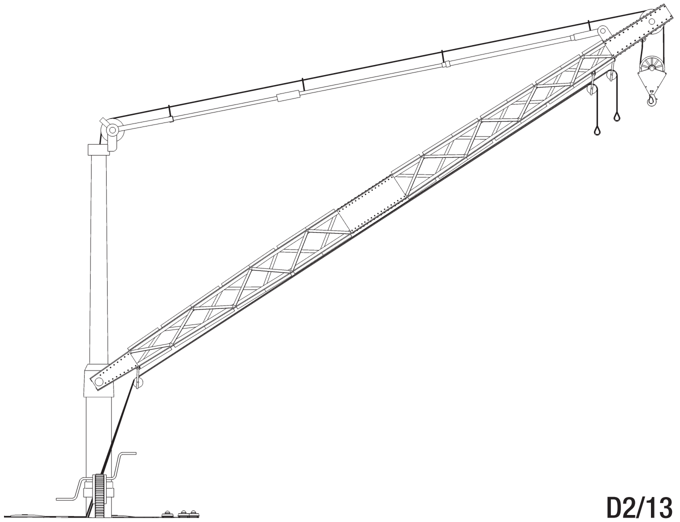
D2/13 BACK VIEW

D2/14 PLAN

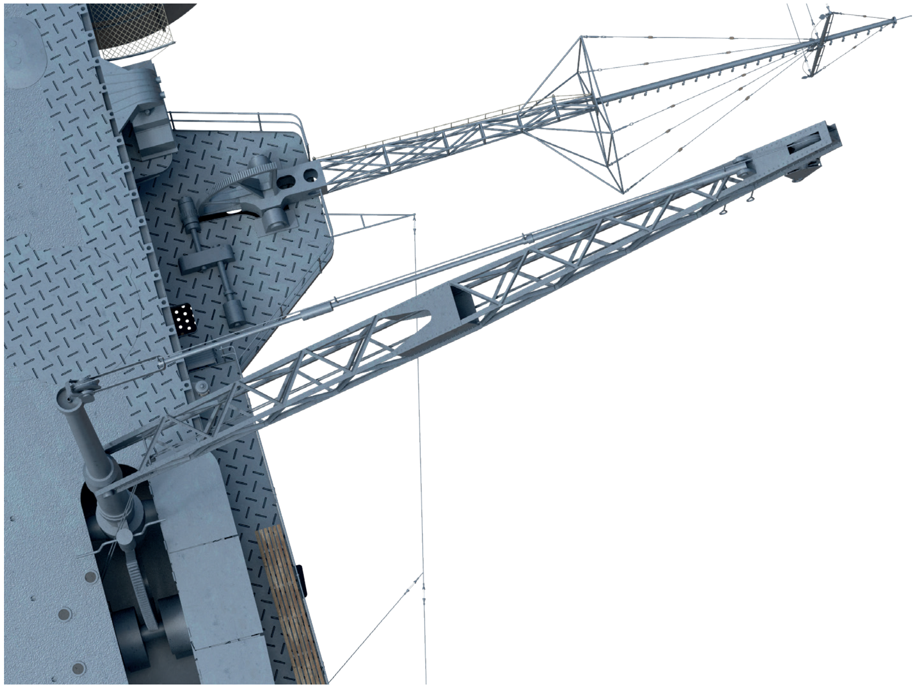


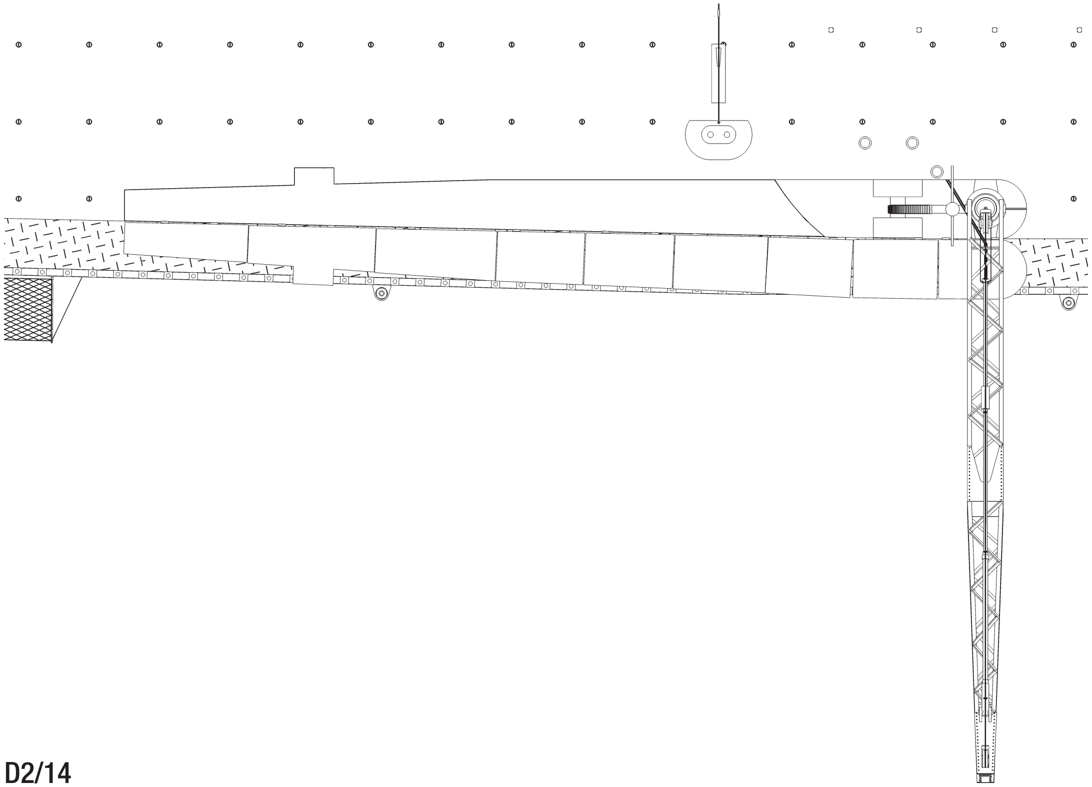
D2/12



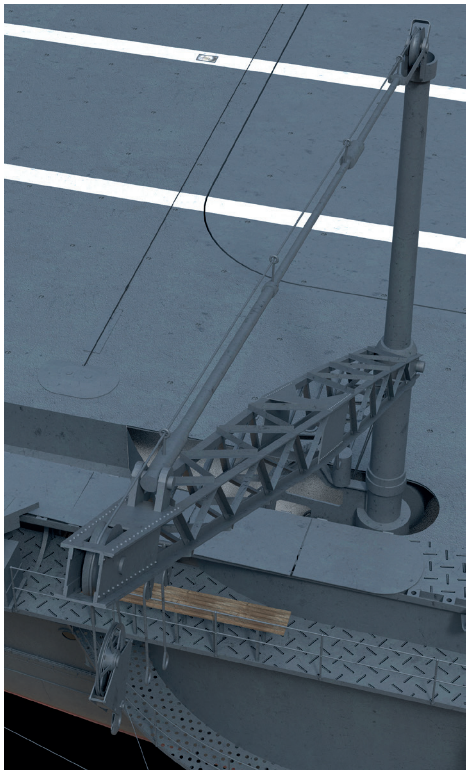


D2/13





D2/14



TYPE 89 12.7CM 40-CALIBRE HIGH ANGLE GUNS, TWIN MOUNT MODEL A1 (1/50 SCALE)

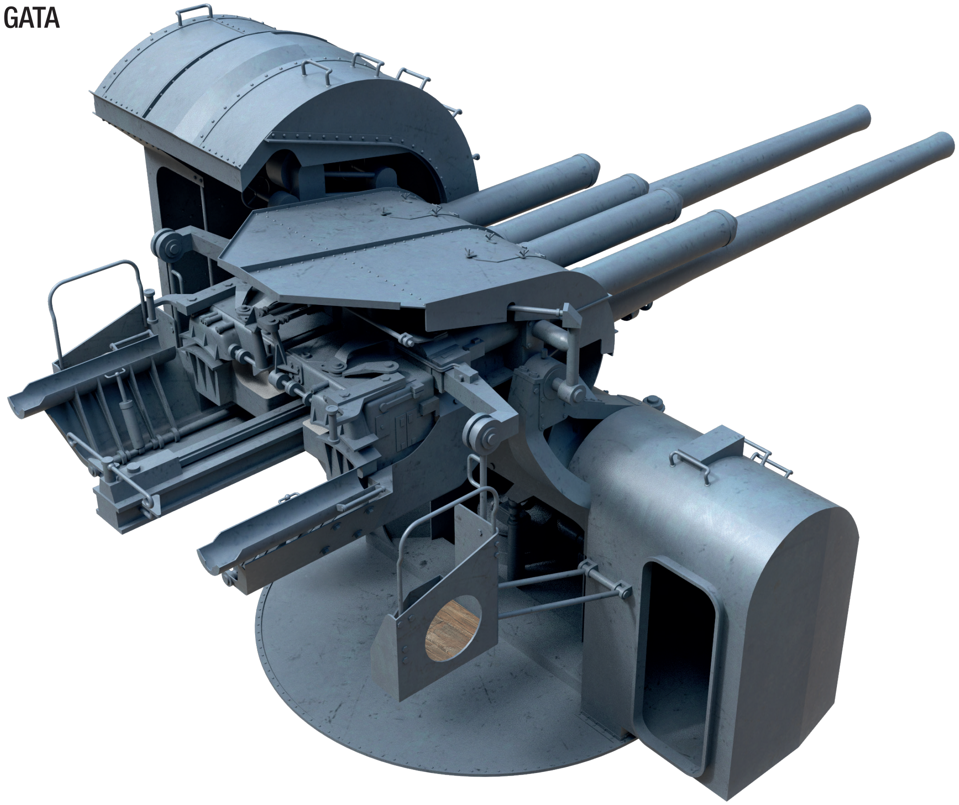
40口径八九式12.7 センチ連装高角砲A1型 – YONJŪ KŌKEI HACHIKYŪ SHIKI JŪNI TEN NANA SENCHI RENSŌ KŌKAKUHŌ A1 GATA

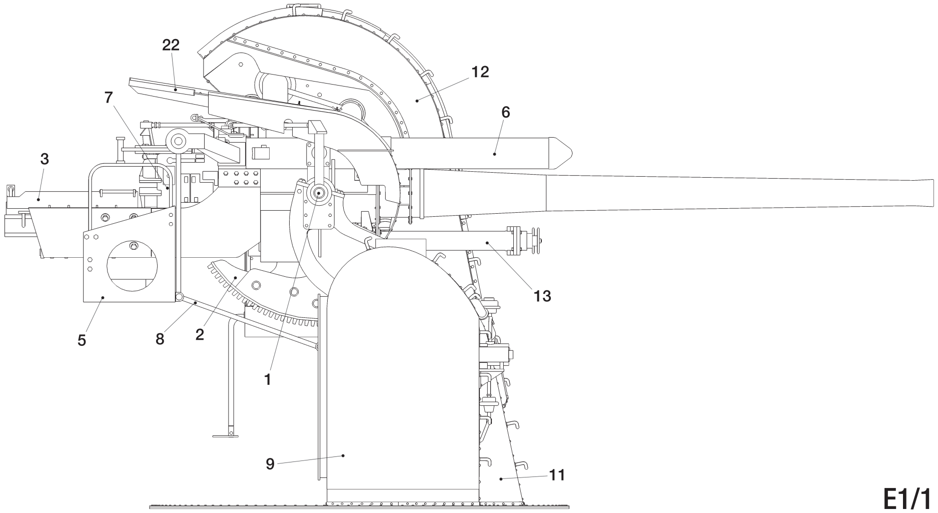
E1/1 RIGHT PROFILE

E1/2 LEFT PROFILE

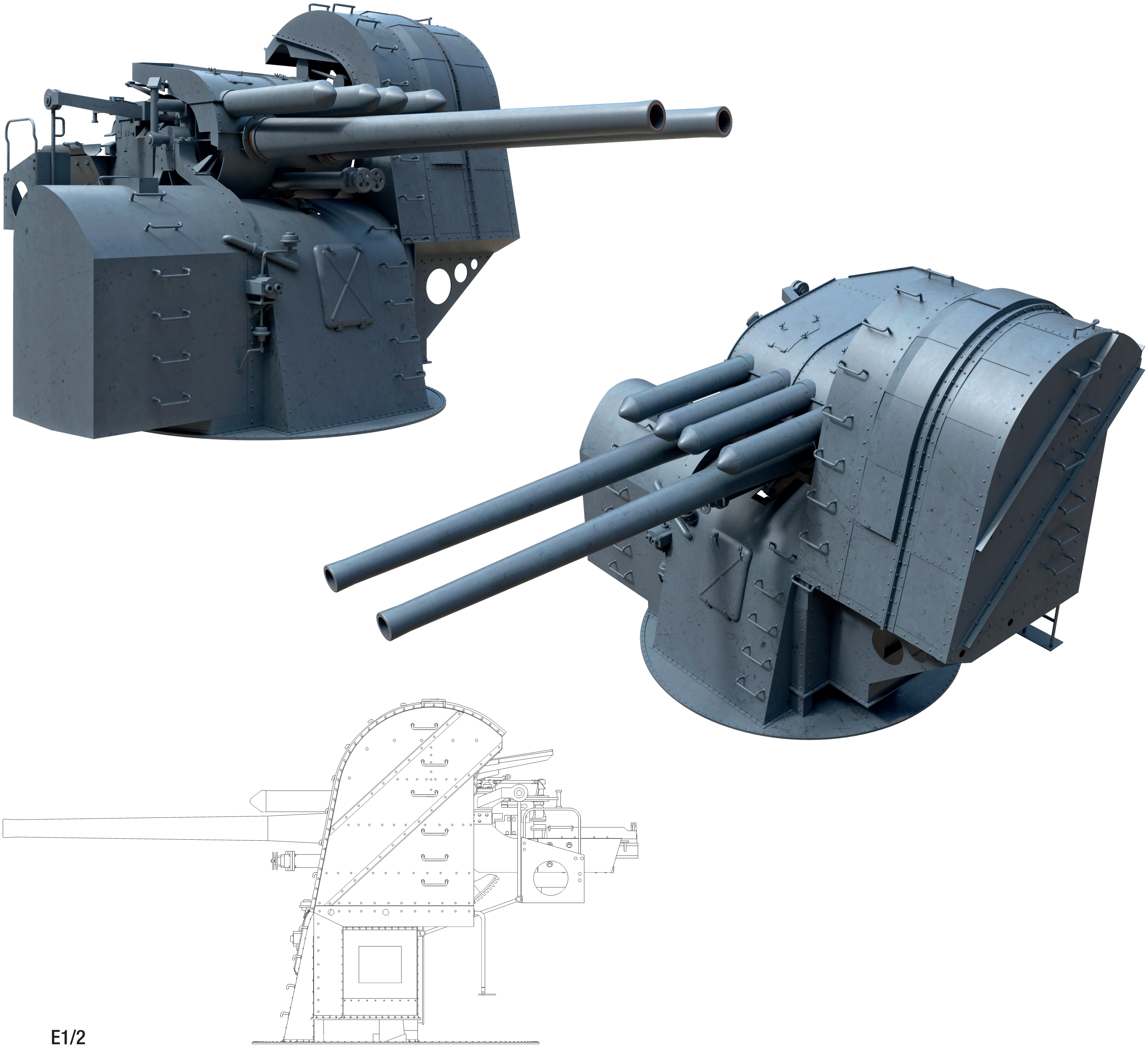
E1/1–8 12.7CM TWIN MOUNT

1 Trunnion
2 Elevating arc
3 Projectile tray
4 Projectile rammer
5 Gun loader's platform
6 Recoil cylinder
7 Breech
8 Pantograph
9 Base ring
10 Electric train motor
11 Electric motor compartment
12 Gun direction platform and shield
13 Recuperator
14 Trainer's seat
15 Pointer's seat
16 Trainer's sight
17 Pointer's sight
18 Trainer's handwheel
19 Pointer's handwheel
20 Gauge
21 Sight adjustment handwheel
22 Breech shield





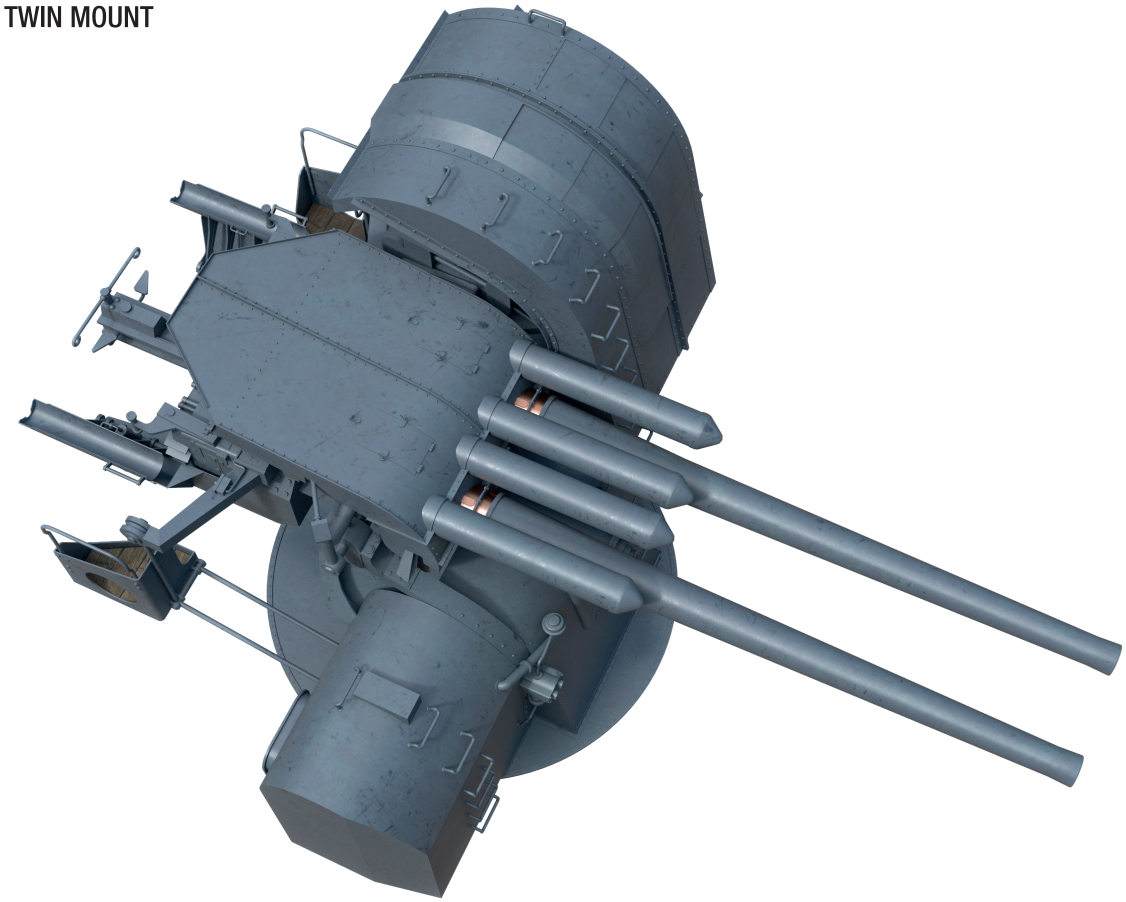
E1/1

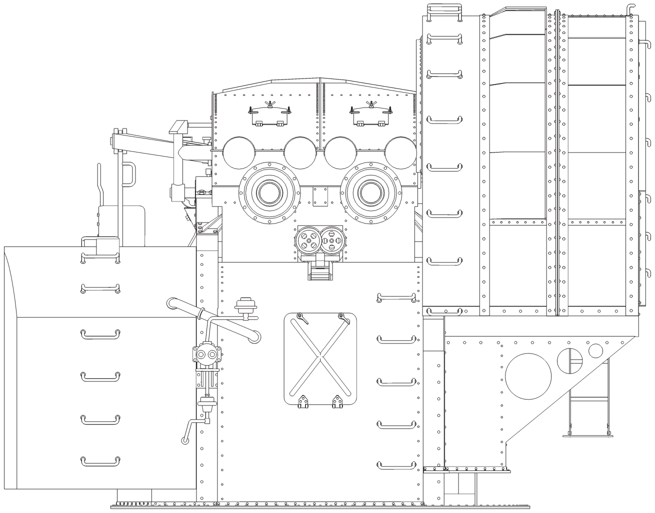


E1/2

TYPE 89 12.7CM 40-CALIBRE HIGH ANGLE GUNS, TWIN MOUNT MODEL A1 (1/50 SCALE)

E1/3 FRONT VIEW
E1/4 BACK VIEW
E1/5 PLAN





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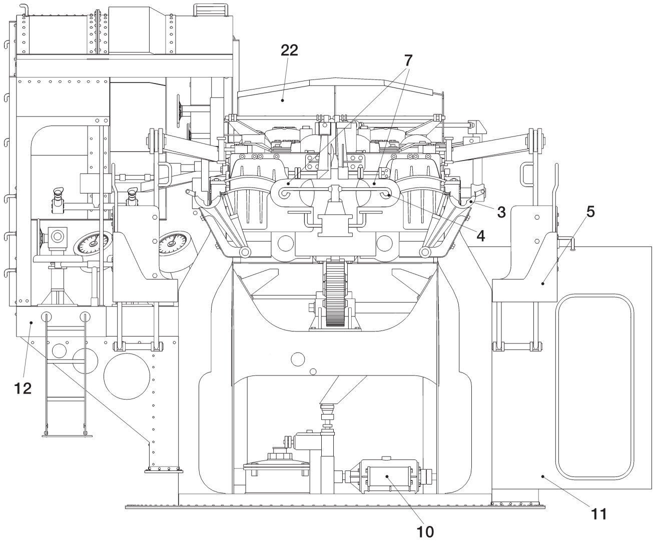

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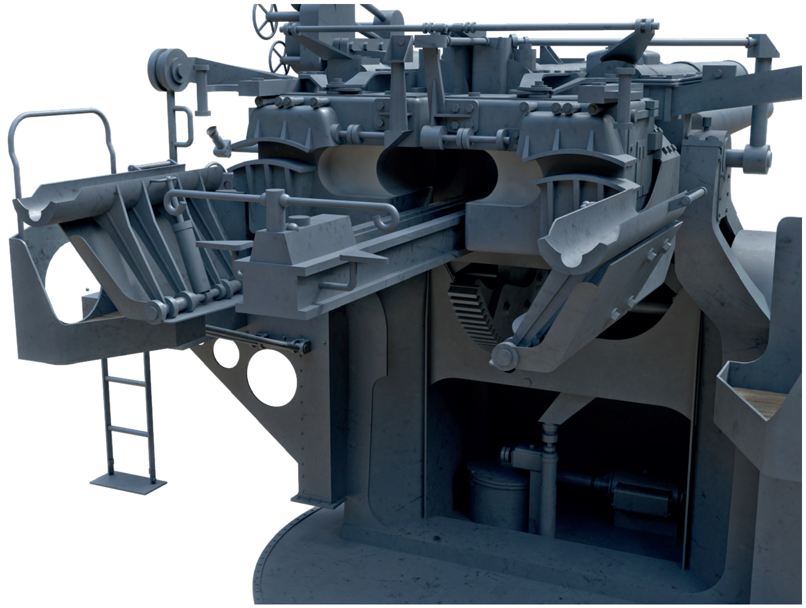
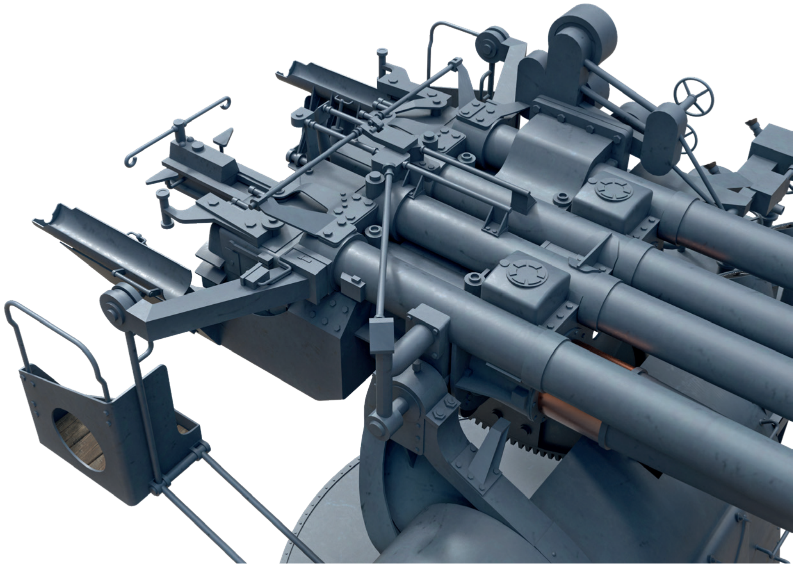
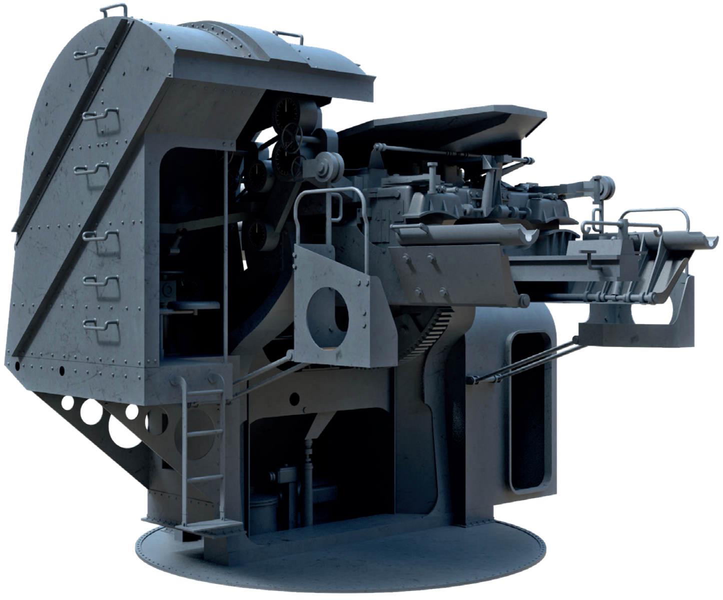
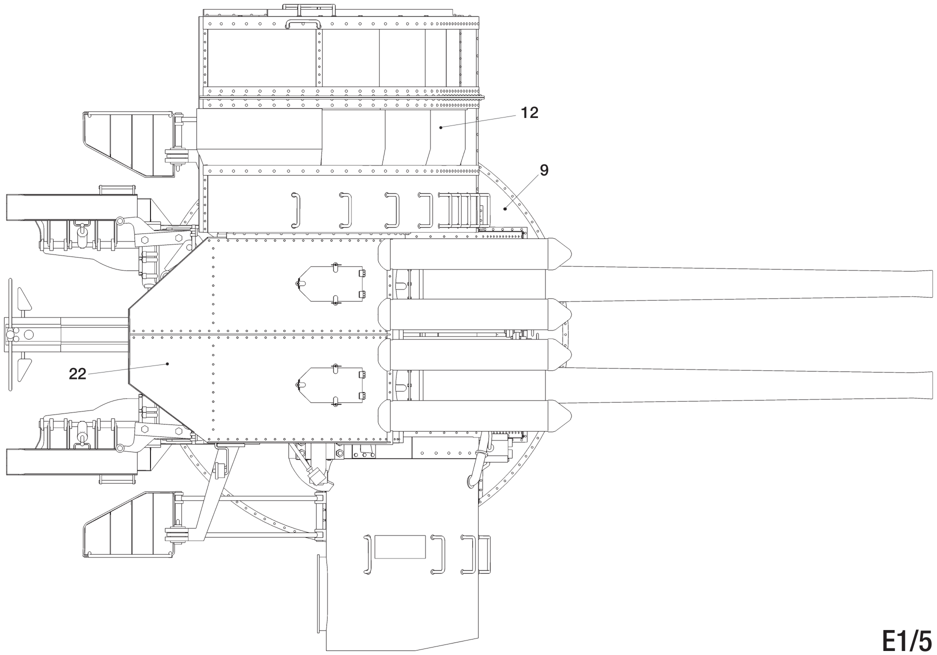




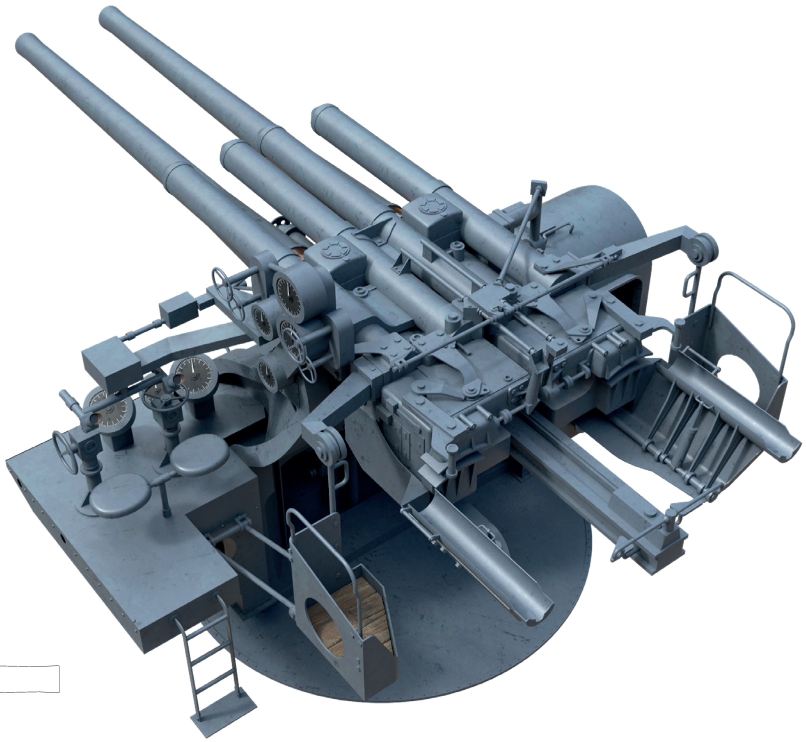


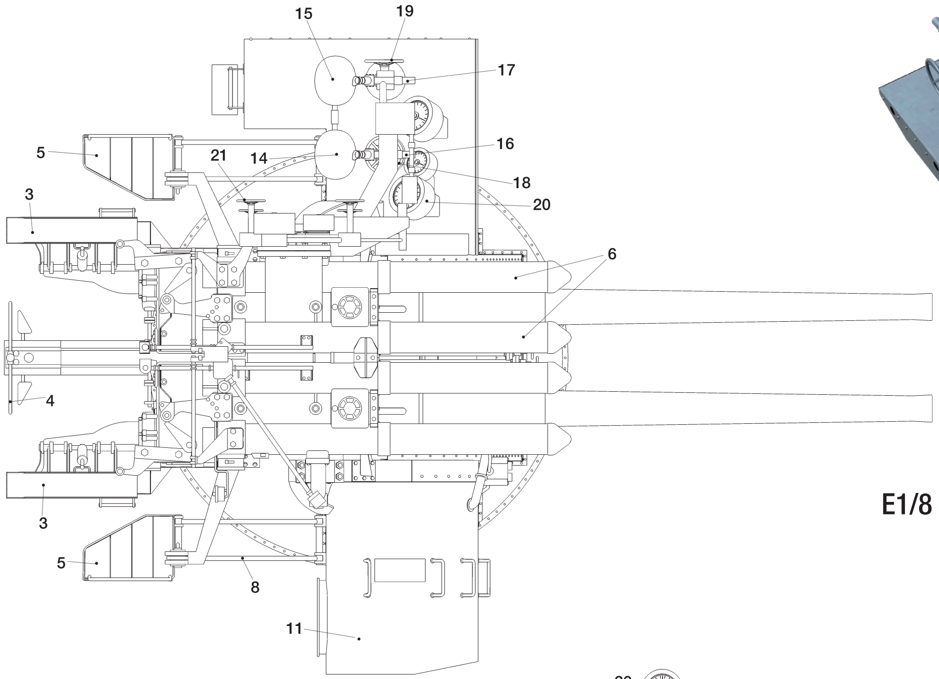


E1/5

TYPE 89 12.7CM 40-CALIBRE HIGH ANGLE GUNS, TWIN MOUNT MODEL A1 (1/50 SCALE)

E1/6 LEFT PROFILE WITH SHIELDS OMITTED FOR CLARITY
E1/7 FRONT VIEW WITH SHIELDS OMITTED FOR CLARITY
E1/8 PLAN WITH SHIELDS OMITTED FOR CLARITY

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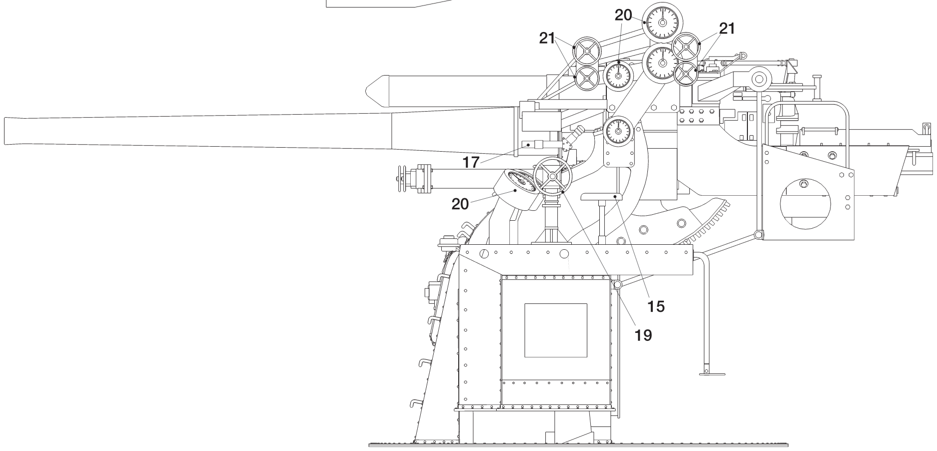
E1/8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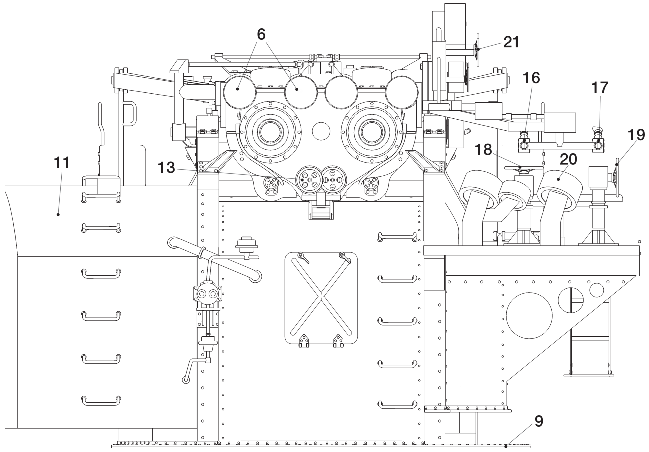
E1/6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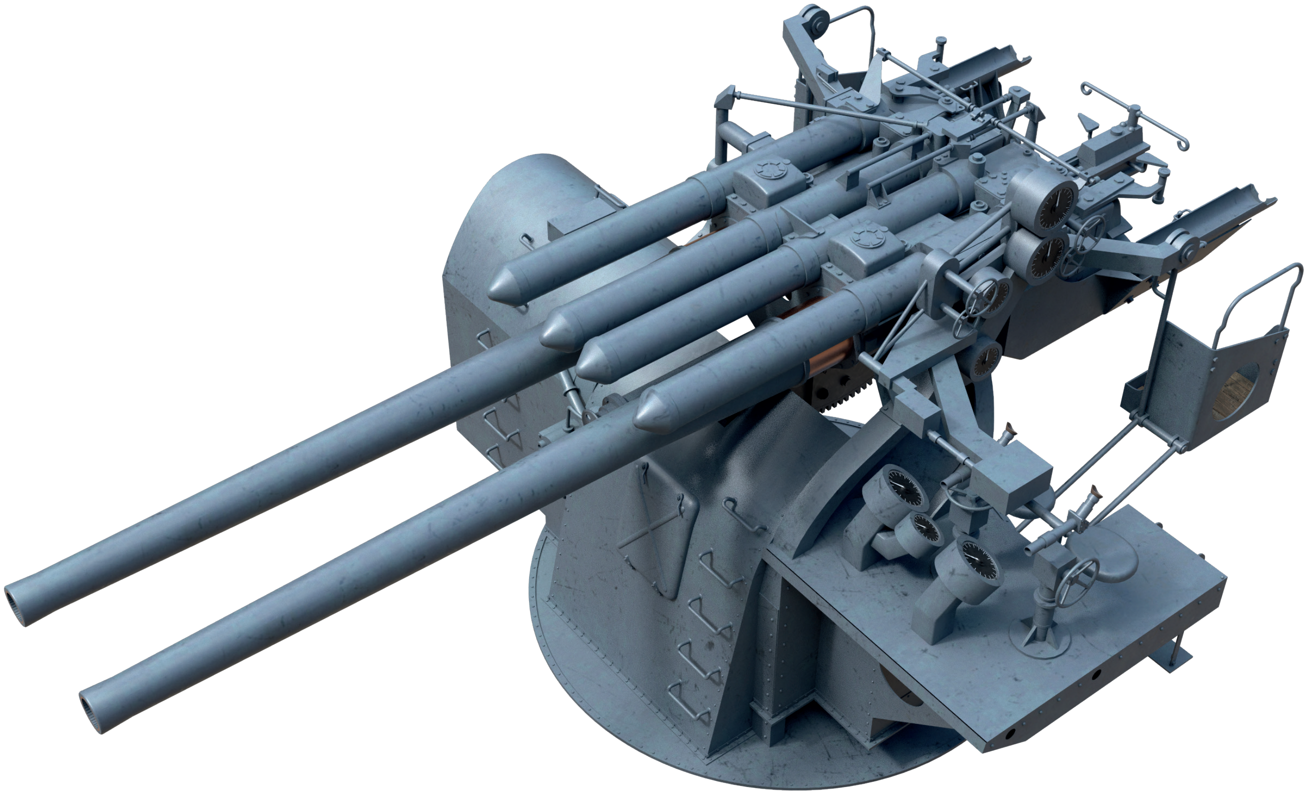
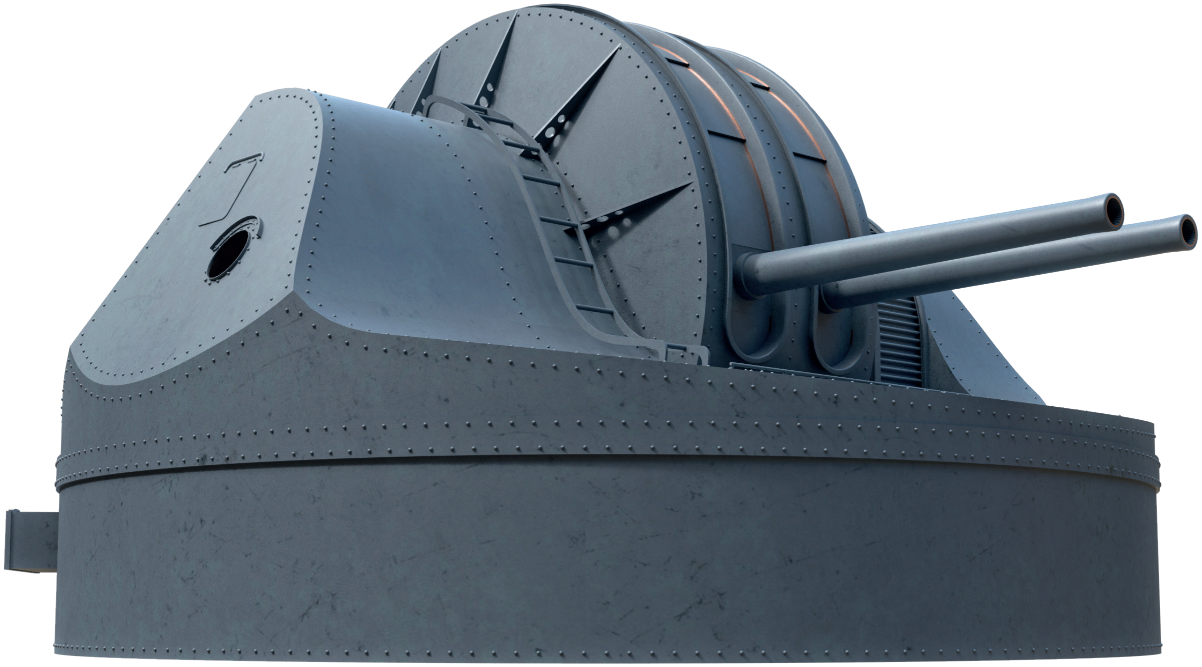
E1/7

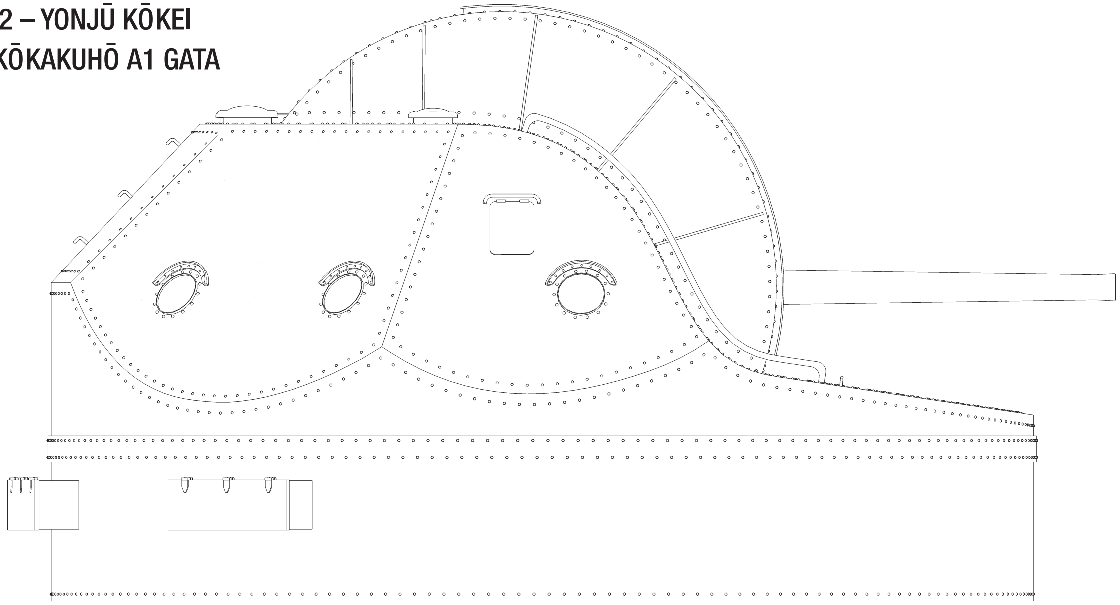




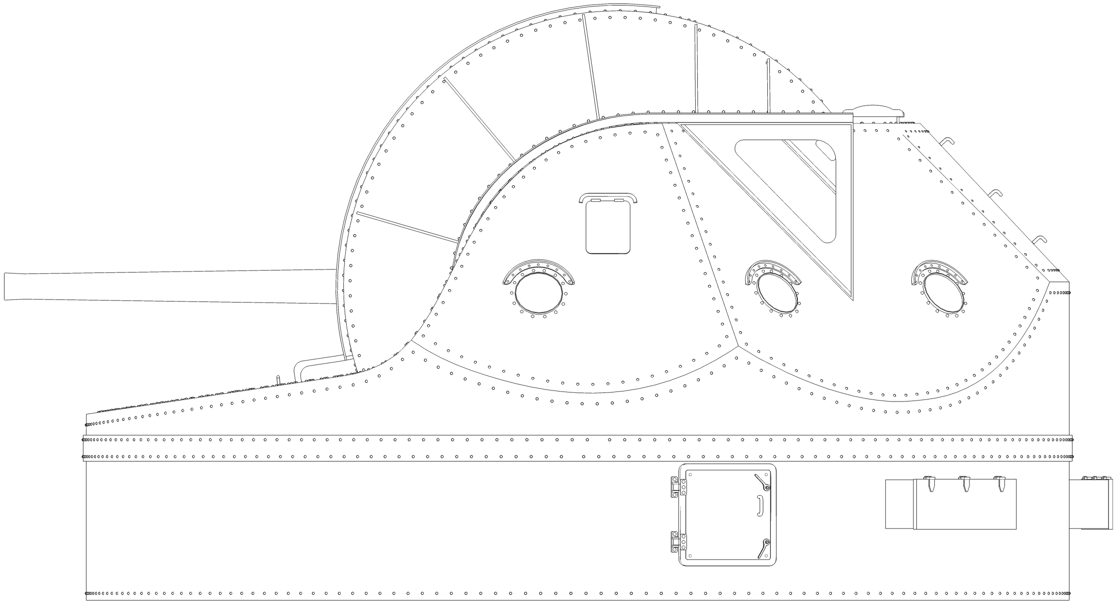
TYPE 89 12.7CM 40-CALIBRE HIGH ANGLE GUNS, TWIN MOUNT MODEL A1 VARIANT 2 (1/50 SCALE)

40口径八九式12.7 センチ連装高角砲A1型改2 – YONJŪ KŌKEI HACHIKYŪ SHIKI JŪNI TEN NANA SENCHI RENSŌ KŌKAKUHŌ A1 GATA KAI NI

E1/9 RIGHT PROFILE
E1/10 LEFT PROFILE

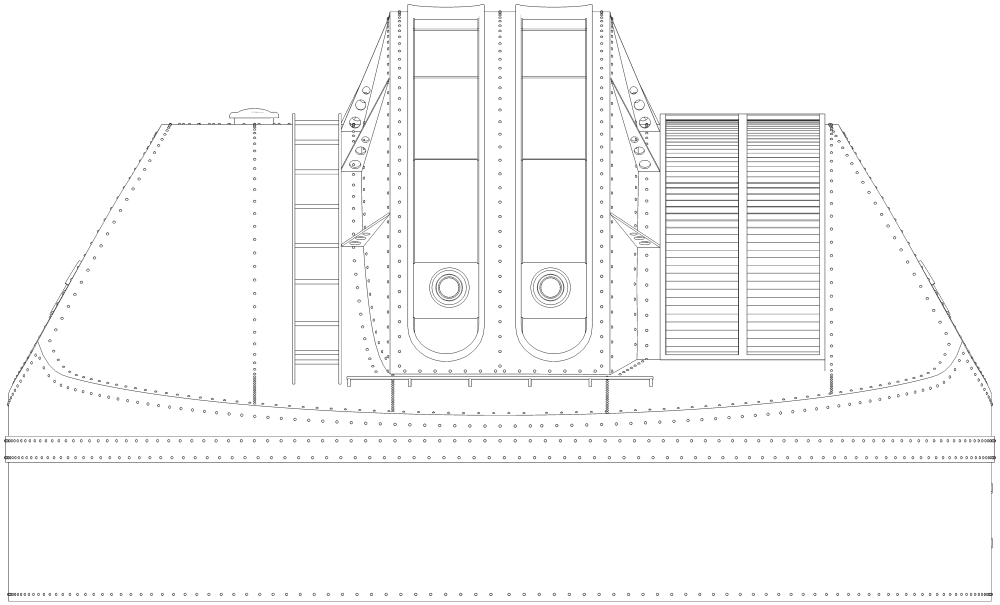


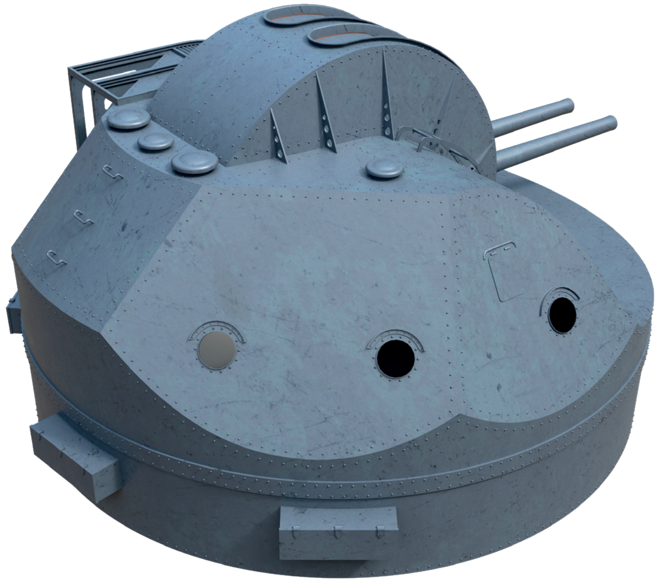
E1/9



E1/10

E1/11 FRONT VIEW
E1/12 BACK VIEW





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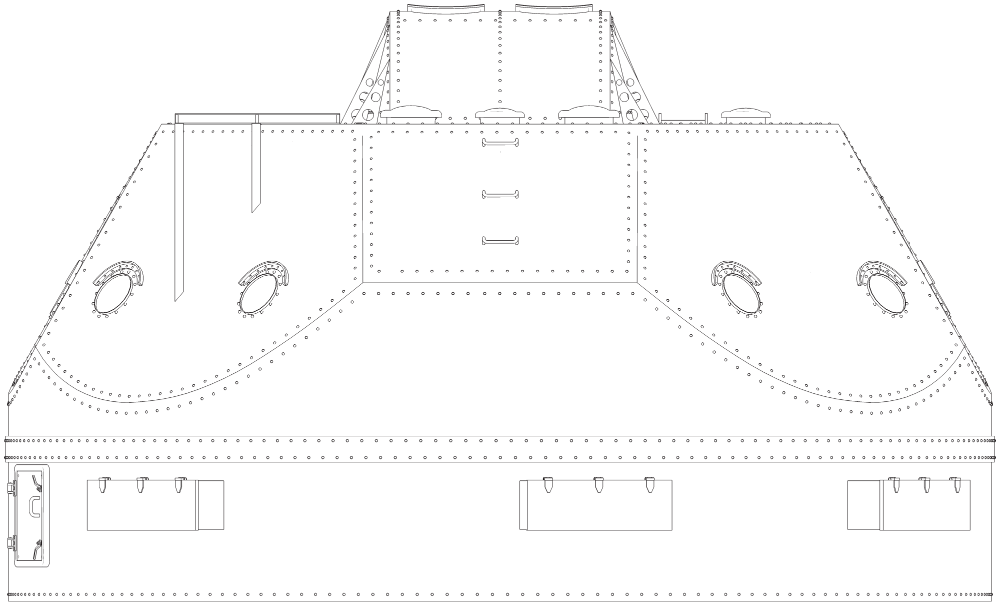
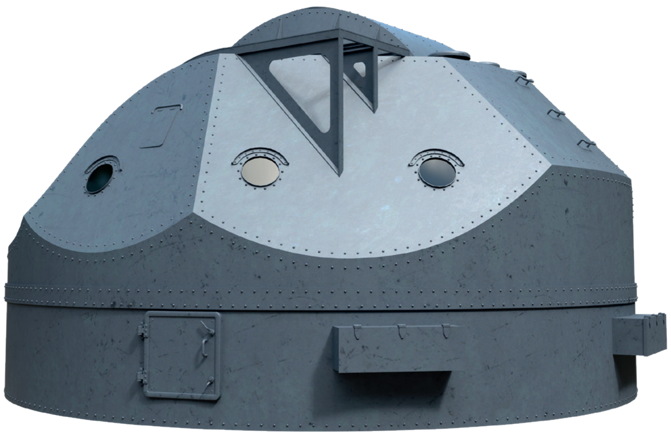
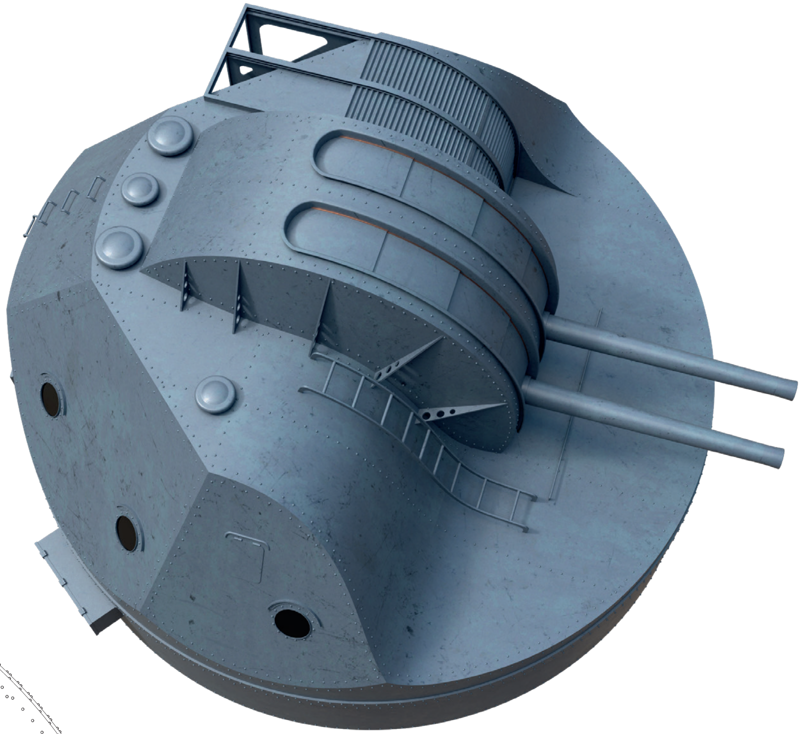


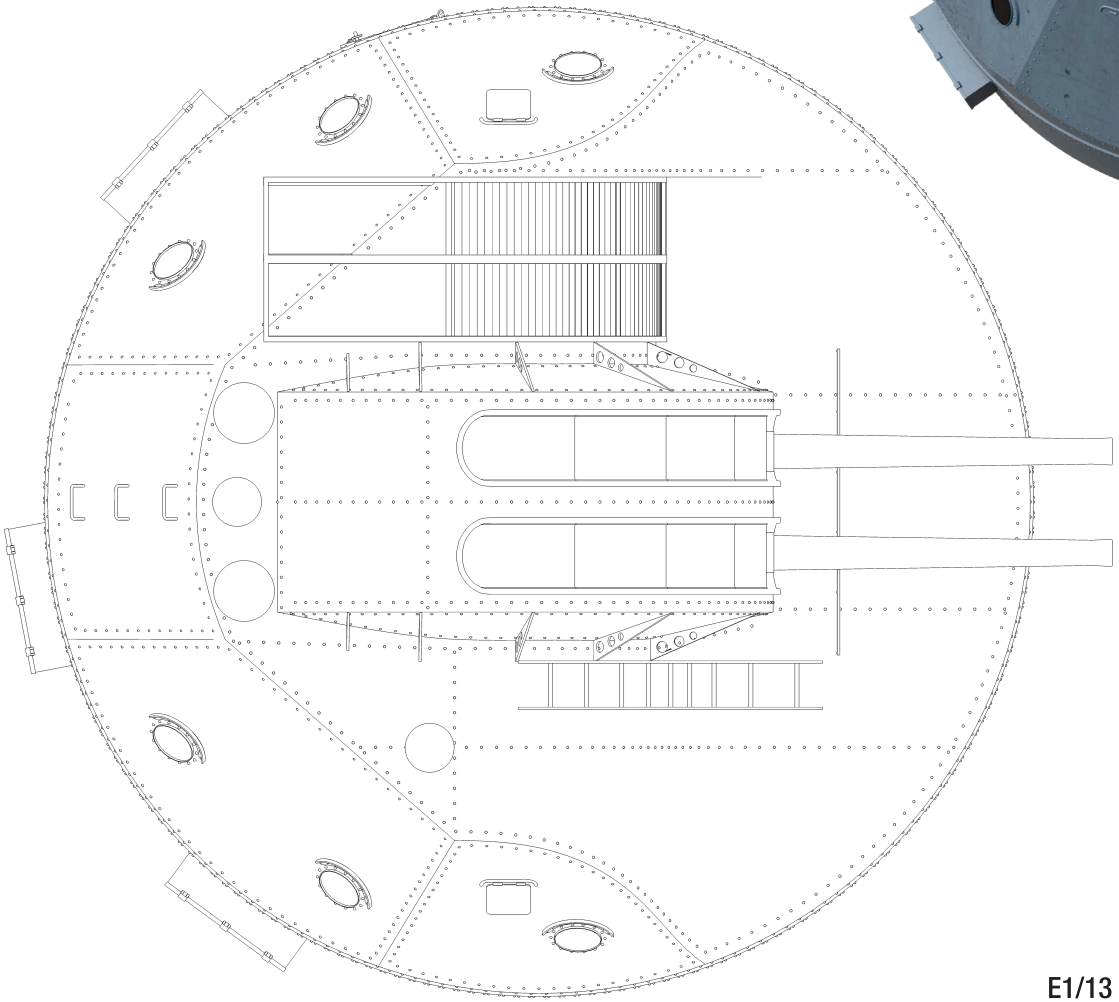


E1/12

TYPE 89 12.7CM 40-CALIBRE HIGH ANGLE GUNS, TWIN MOUNT
MODEL A1 VARIANT 2 (1/50 SCALE)

E1/13 PLAN

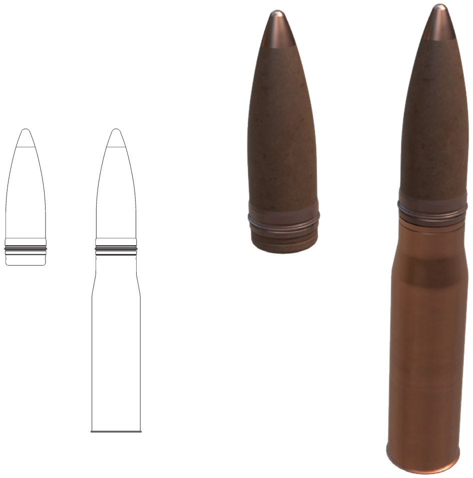




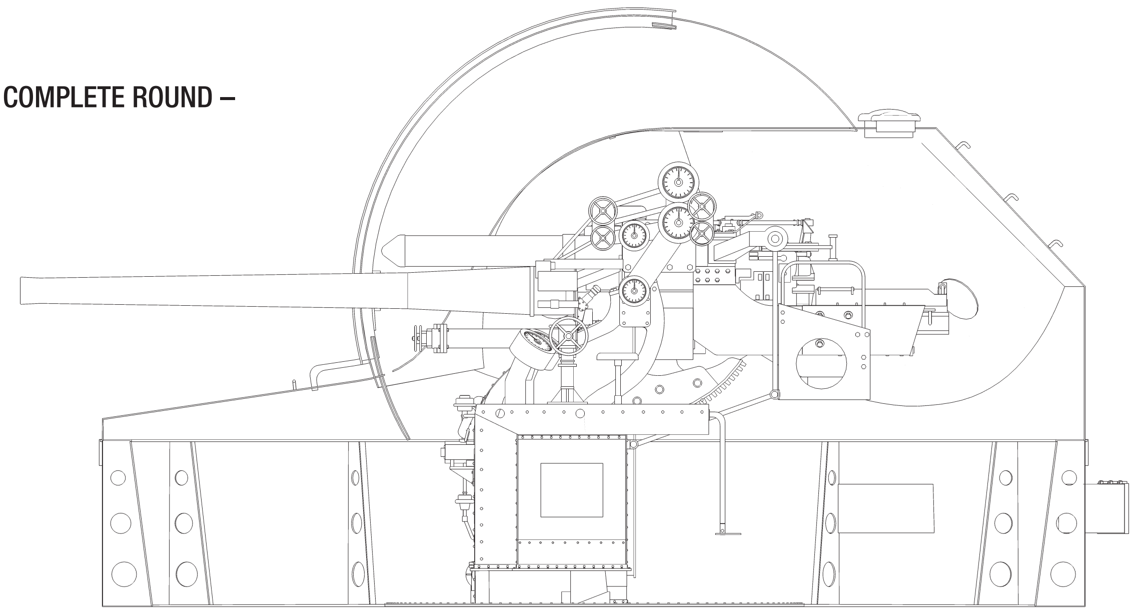
E1/13

E1/14 INTERNAL PROFILE

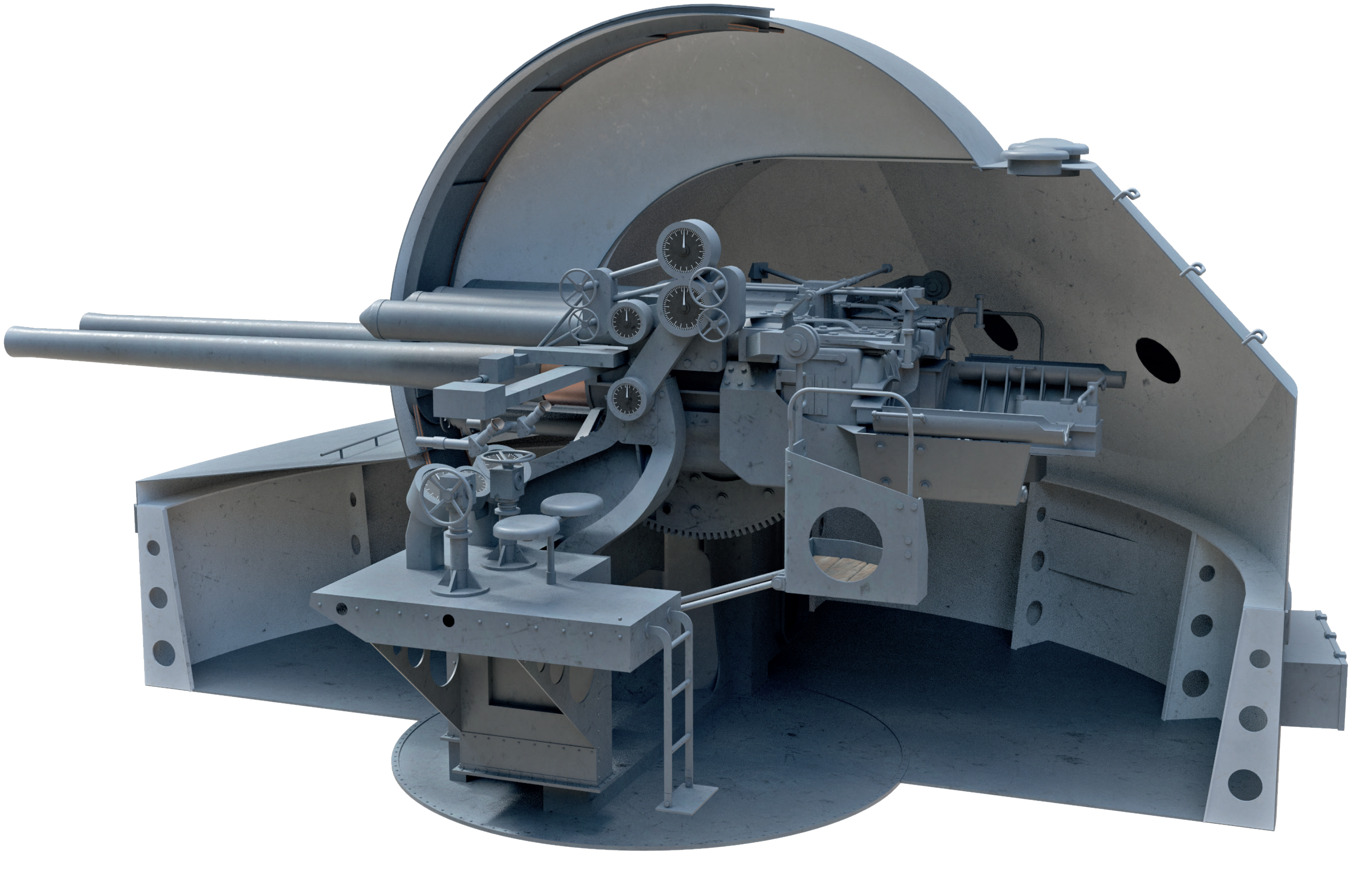
E1/15 TYPE 0 HIGH EXPLOSIVE PROJECTILE AND COMPLETE ROUND – PROFILE (1/25 SCALE)



E1/15

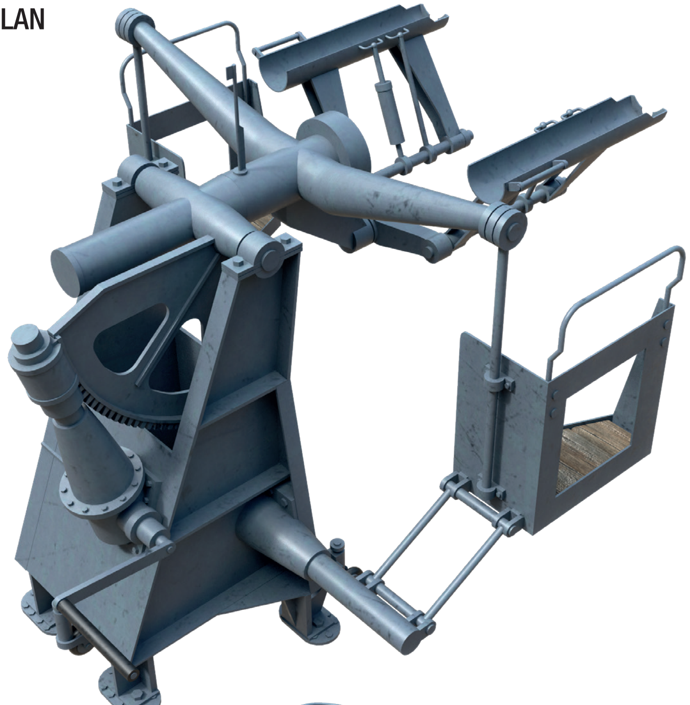


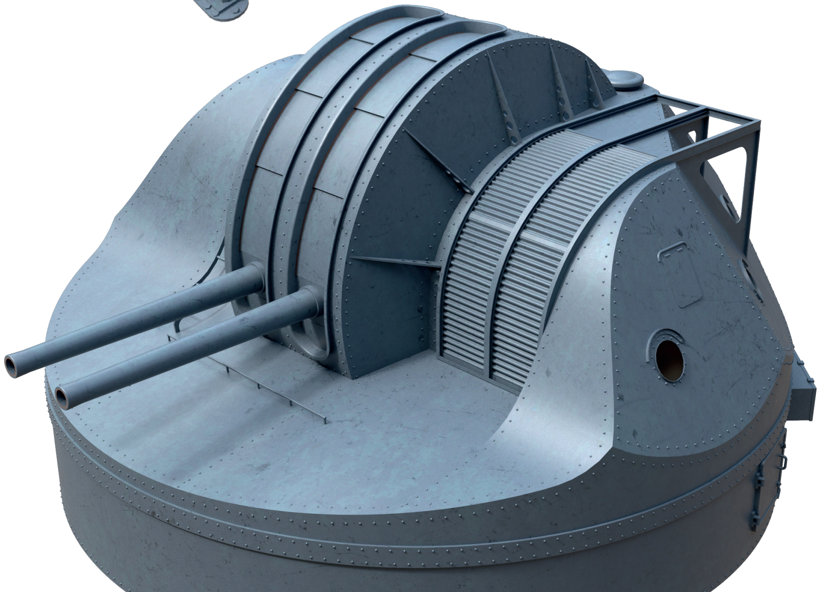
E1/14

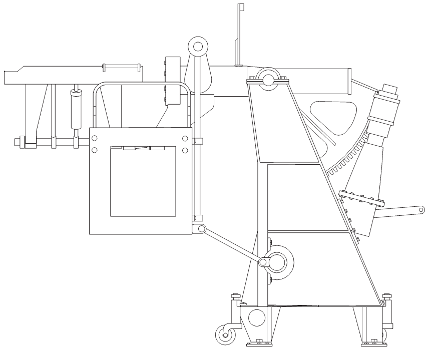


HIGH ANGLE GUN PRACTICE LOADING MACHINE (1/50 SCALE)

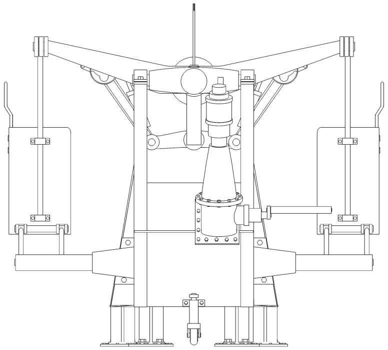
E1/16 RIGHT PROFILE
E1/17 FRONT VIEW
E1/18 BACK VIEW
E1/19 PLAN



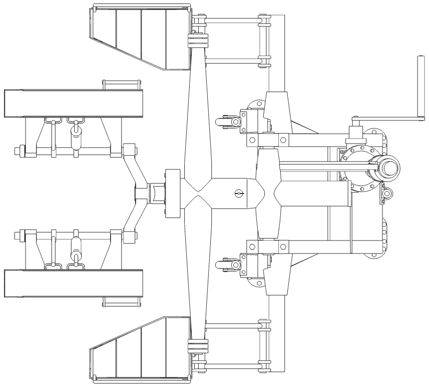




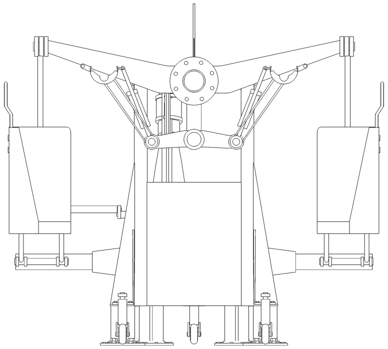
E1/16



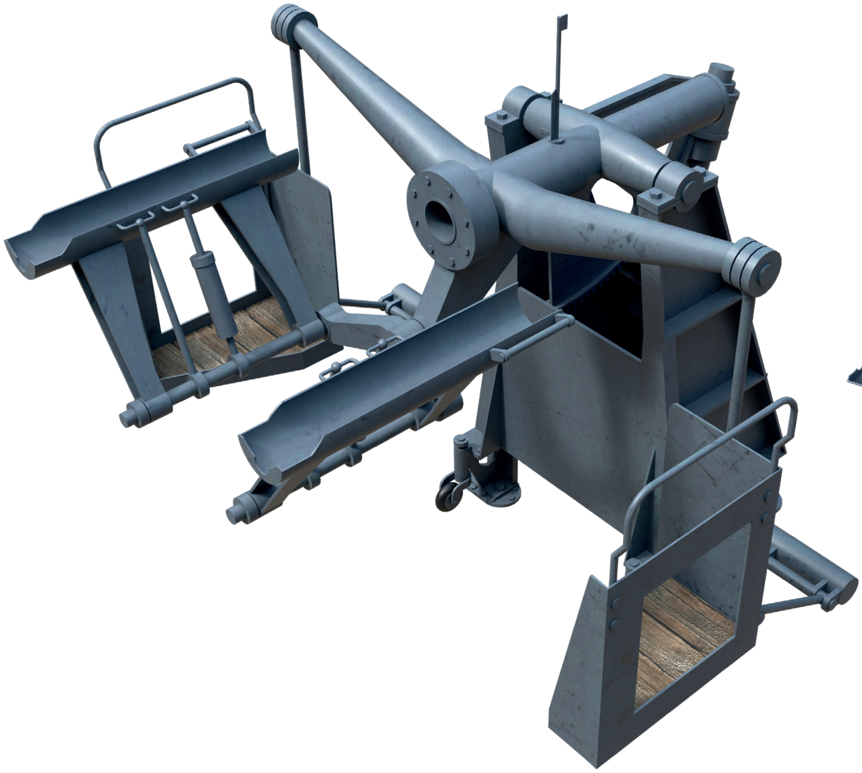
E1/17

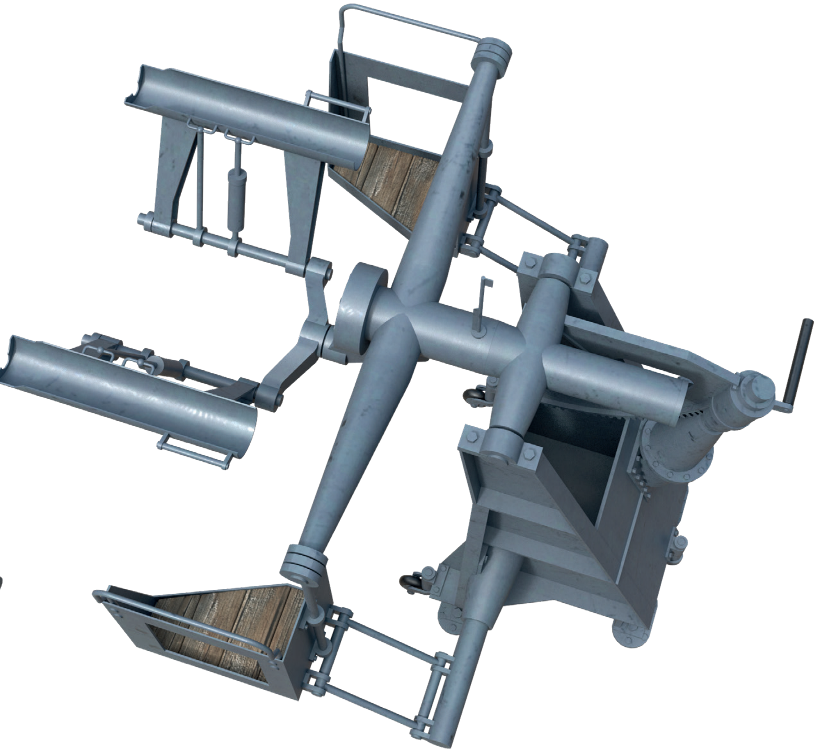


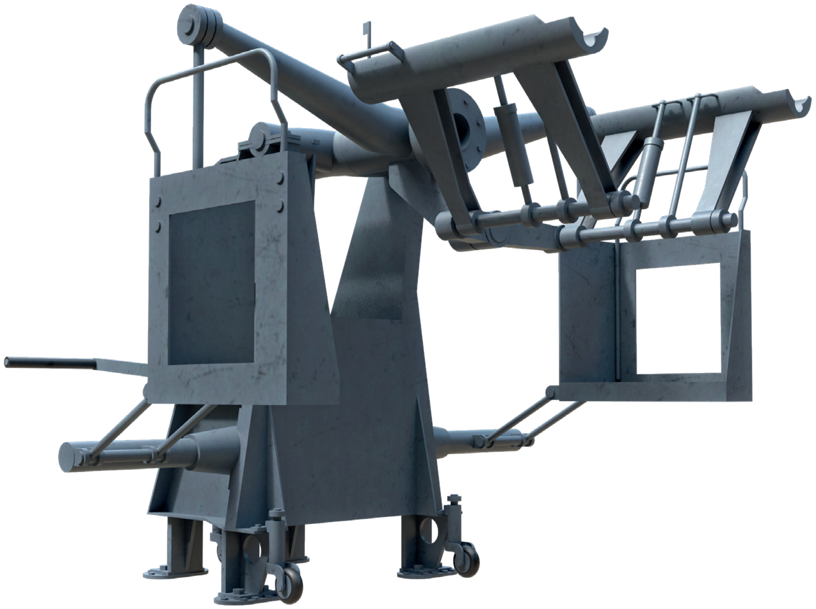
E1/19

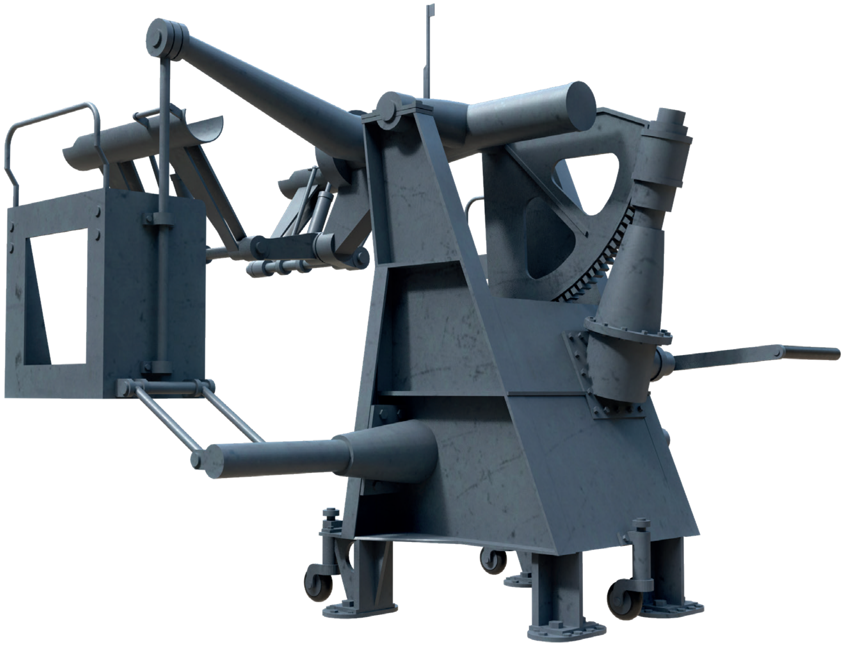


E1/18









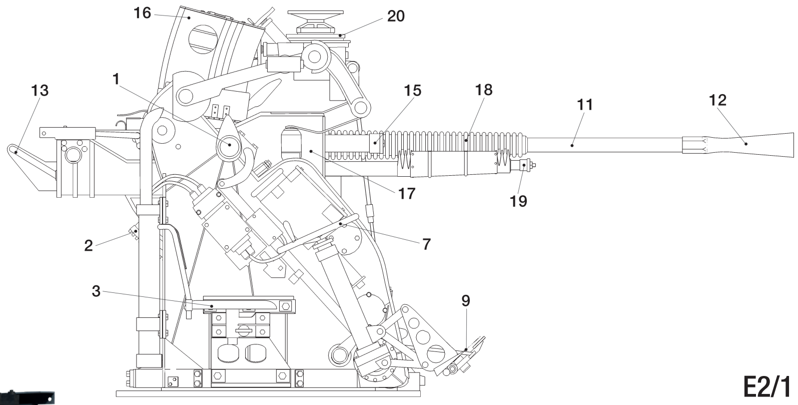
TYPE 96 25MM MACHINE GUNS IN A TWIN MOUNT (1/25 SCALE)

九六式25ミリ連装機銃 – KUROKU SHIKI NIJŪ GO MIRI RENSŌ KIJŪ

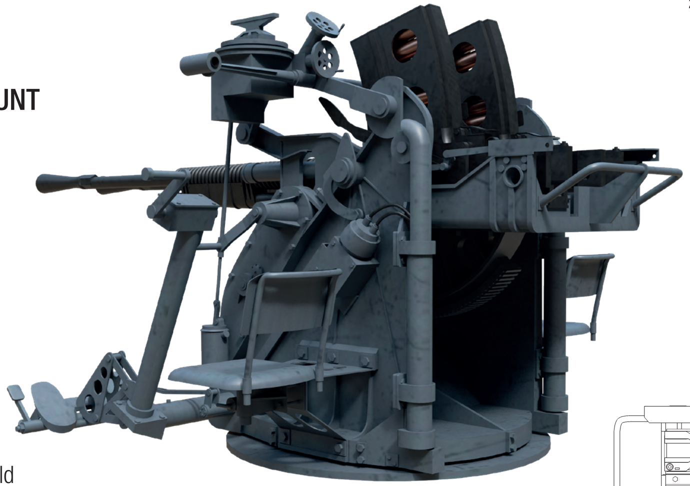
E2/1 RIGHT PROFILE
E2/2 LEFT PROFILE
E2/3 FRONT VIEW
E2/4 BACK VIEW
E2/5 PLAN

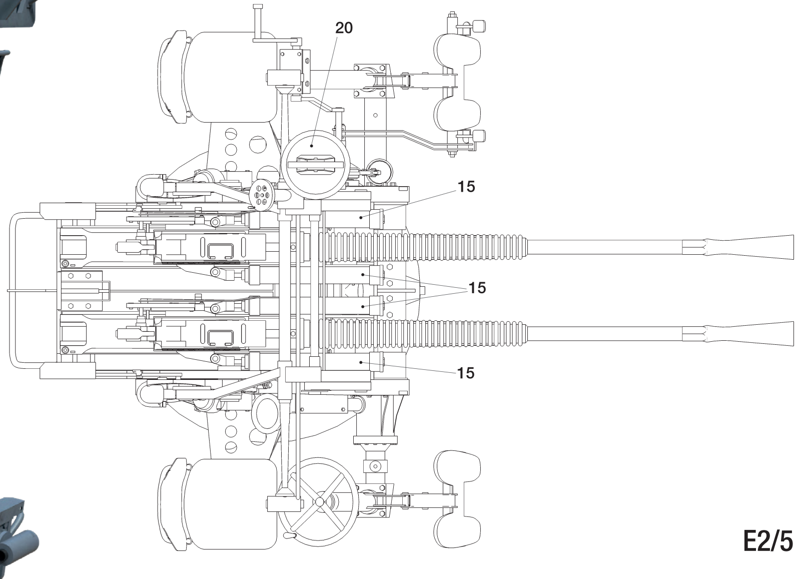
E2/1–5 25MM TWIN MOUNT

1 Trunnion
2 Elevating arc
3 Trainer's seat
4 Pointer's seat
5 Trainer's sight
6 Pointer's sight
7 Trainer's handwheel
8 Pointer's handwheel
9 Foot rest
10 Firing pedal
11 Barrel
12 Flash guard
13 Guard
14 Cartridge case ejector shield
15 Recoil cylinder
16 Magazine with 15 rounds
17 Top carriage
18 Radiator
19 Gas valve with shield
20 Le Prieur lead computing sight (LPR sight)
21 Speed adjustment handwheel
22 Distance adjustment handwheel

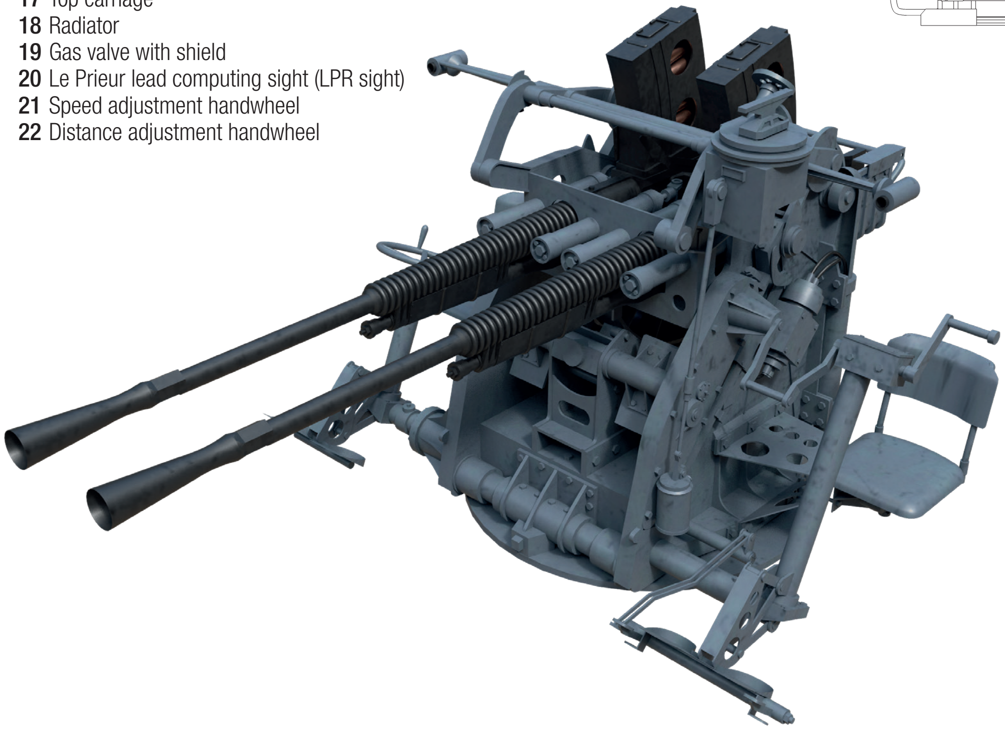


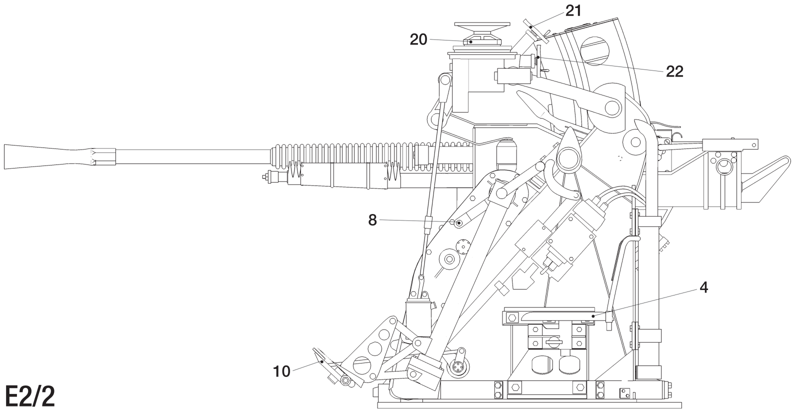
E2/1





E2/5

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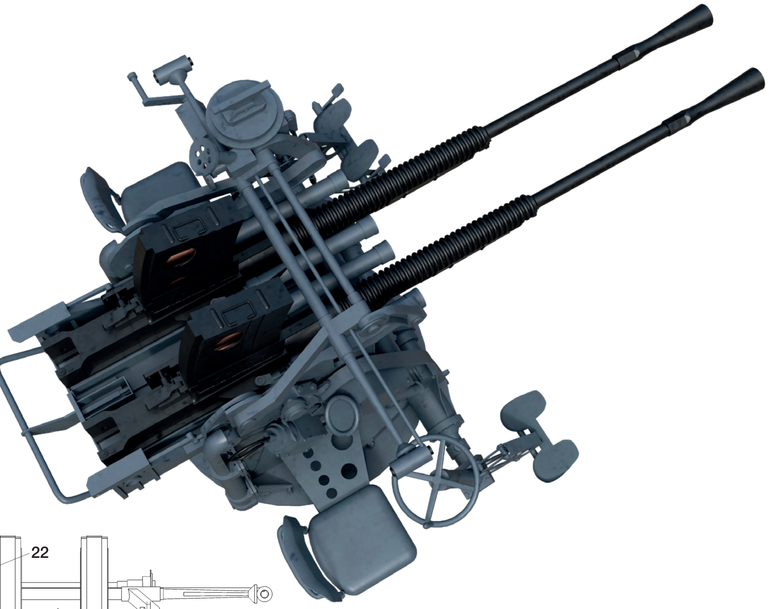
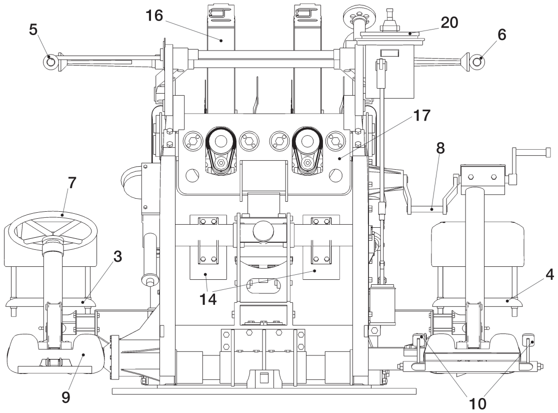
E2/2

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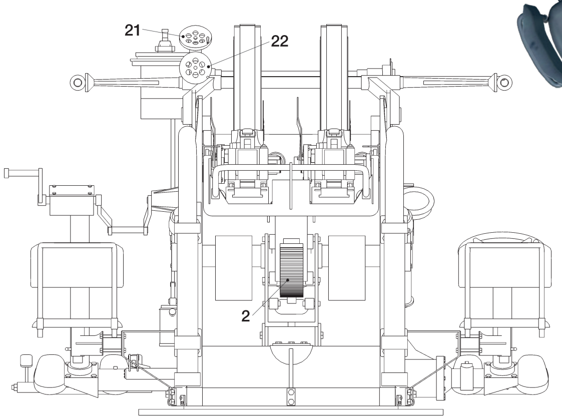
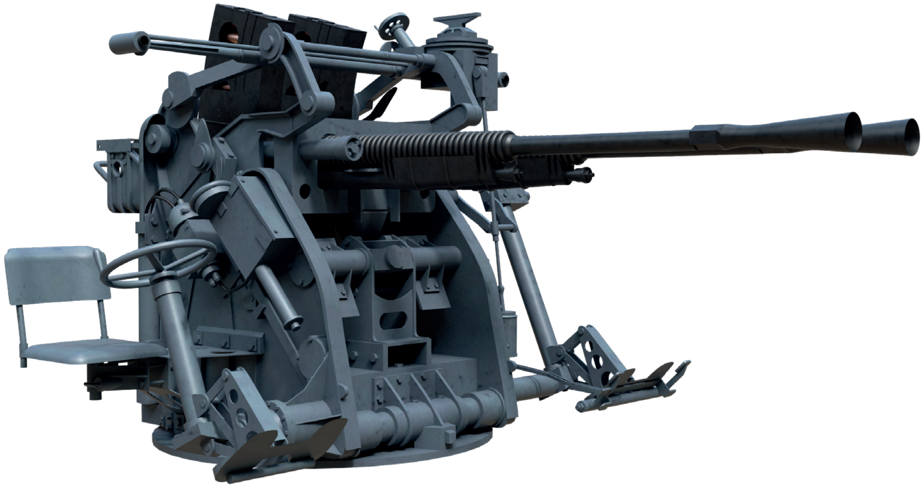
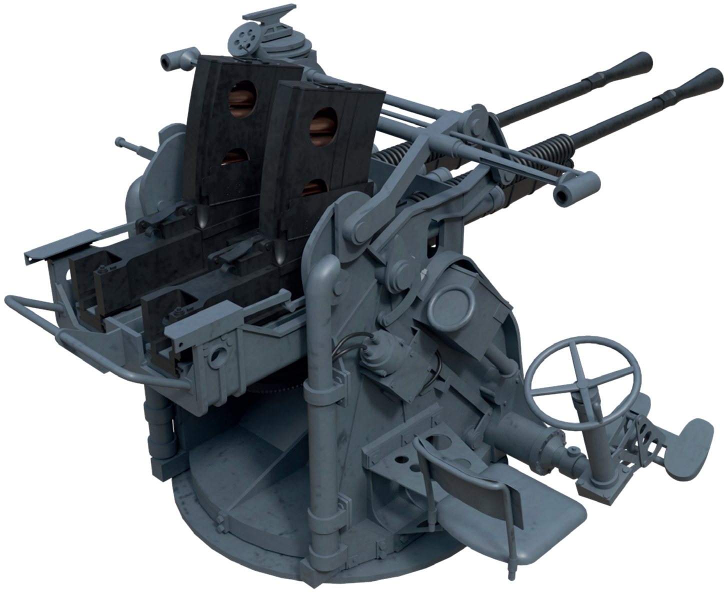
E2/3



E2/4

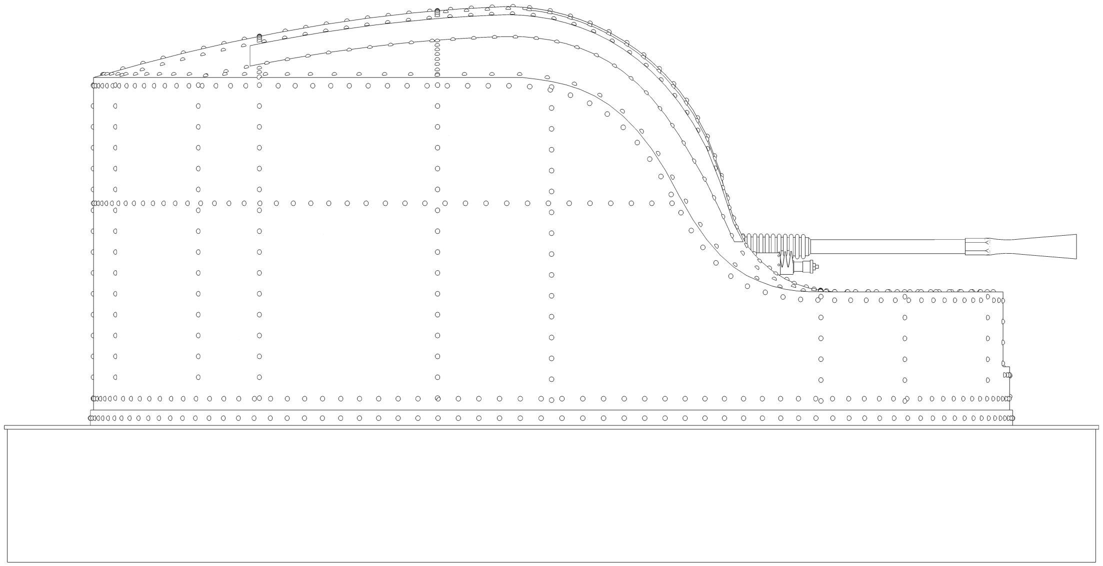




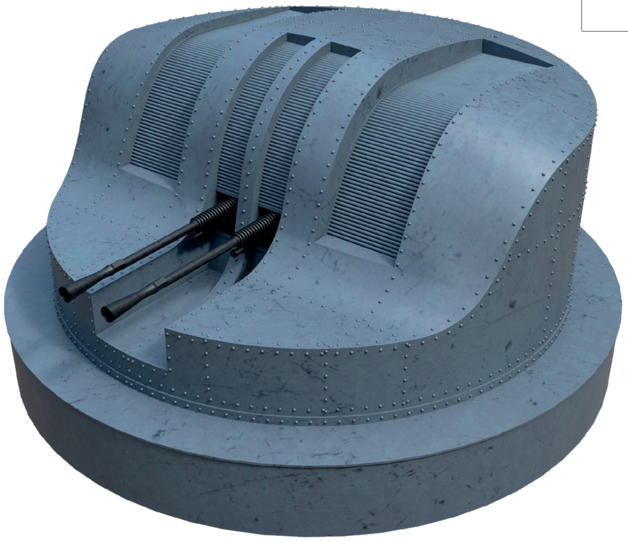
E ARMAMENT – TYPE 96 25MM GUNS

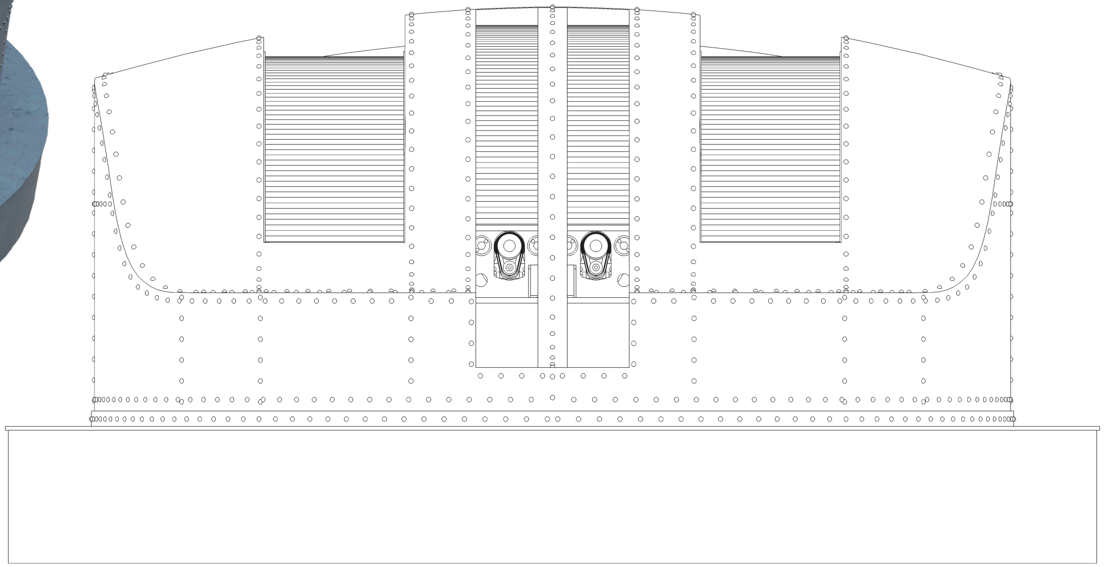
TYPE 96 25MM MACHINE GUNS IN A TWIN MOUNT WITH ANTI-SMOKE SHIELD (1/25 SCALE)

E2/6 RIGHT PROFILE
E2/7 LEFT PROFILE
E2/8 FRONT VIEW
E2/9 BACK VIEW



E2/6





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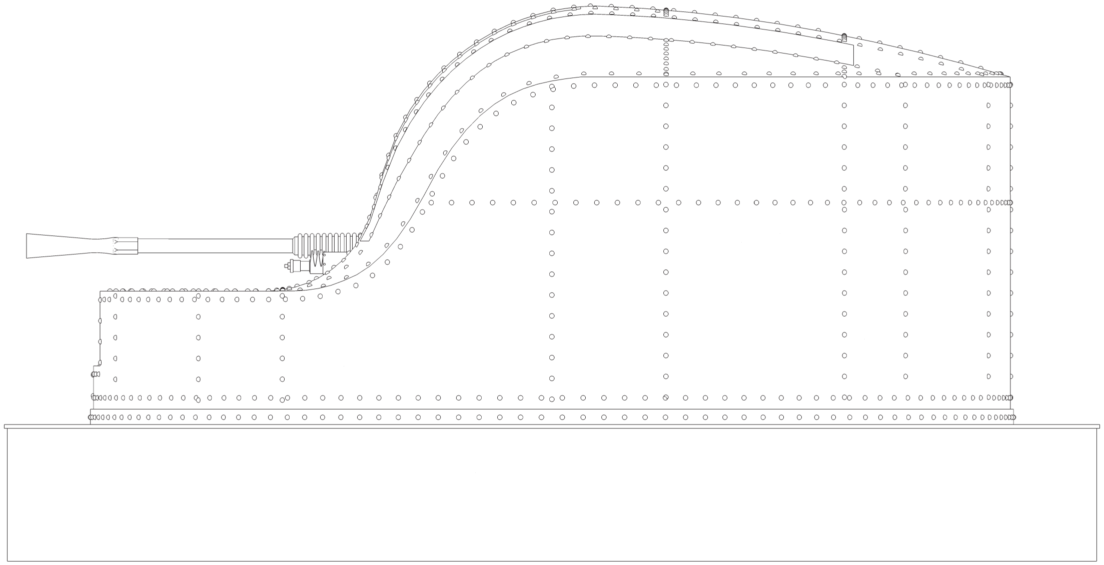
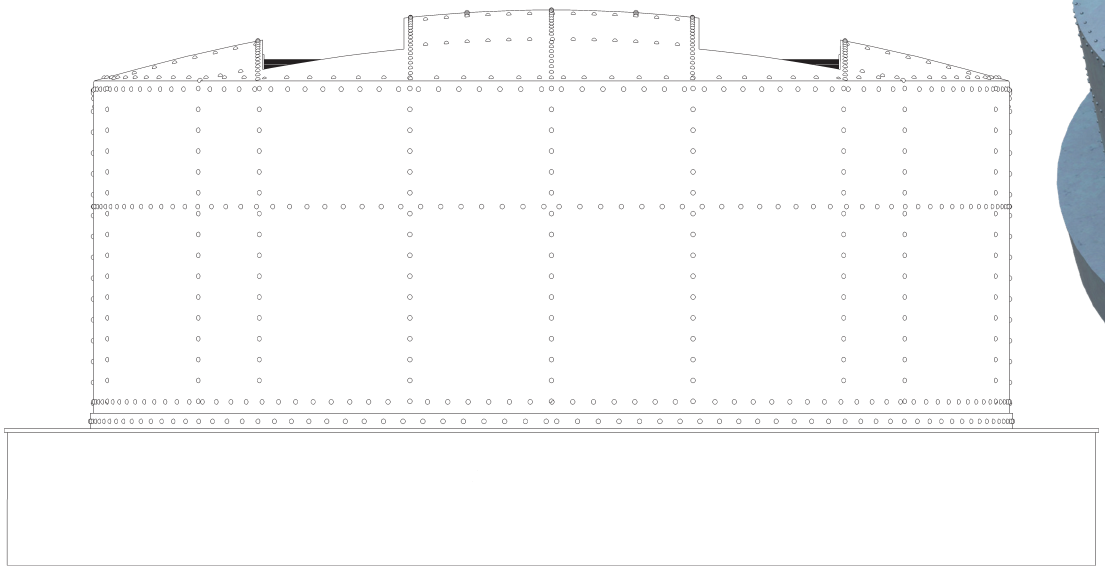
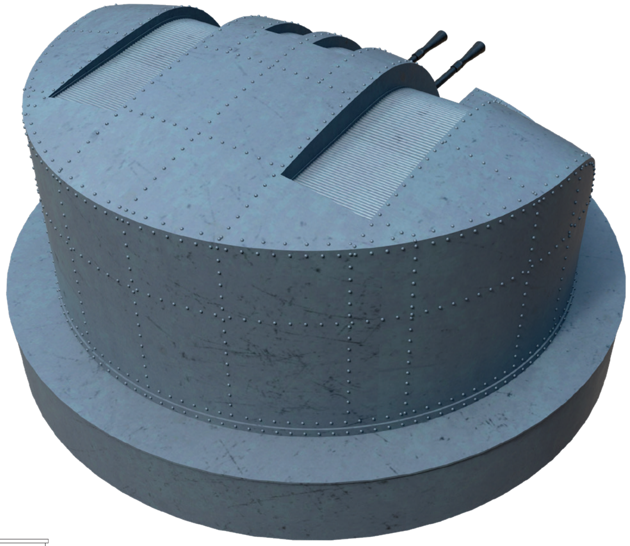


E2/7



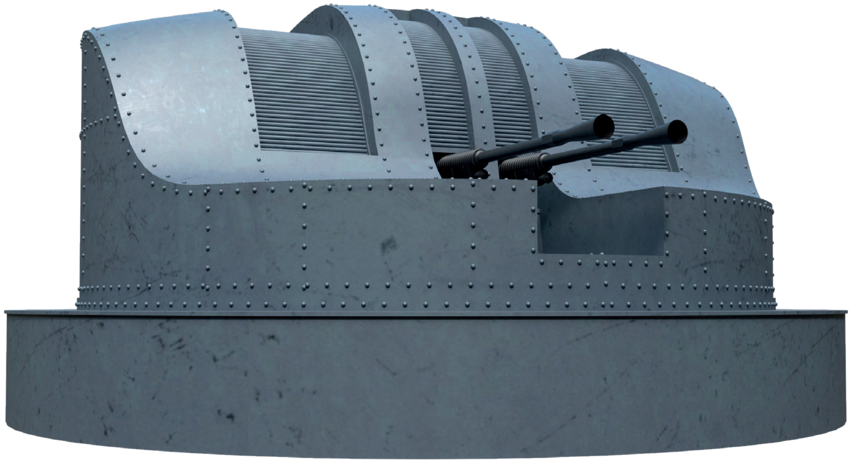


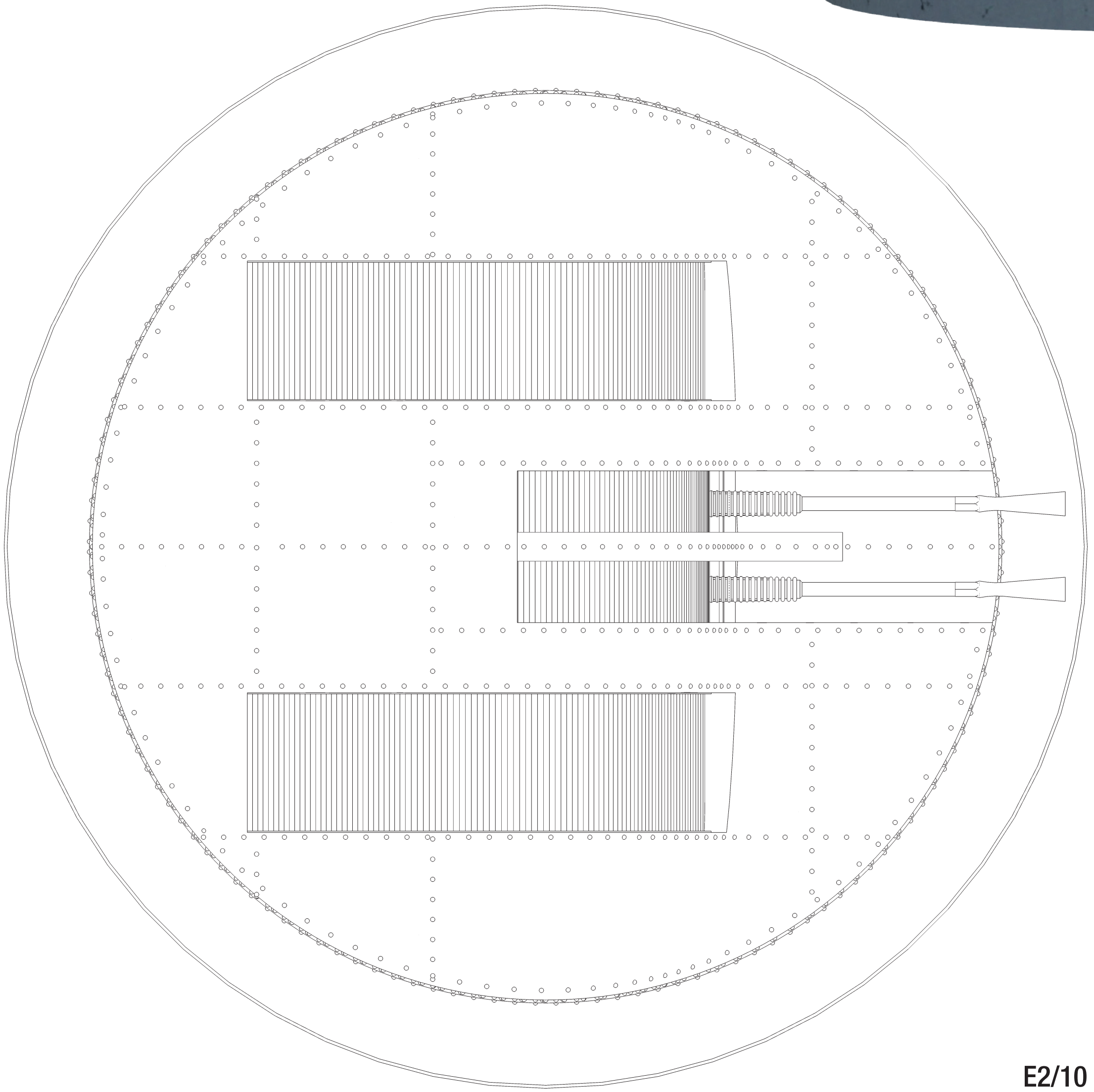
E2/9

TYPE 96 25MM MACHINE GUNS IN A TWIN MOUNT WITH ANTI-SMOKE SHIELD (1/25 SCALE)

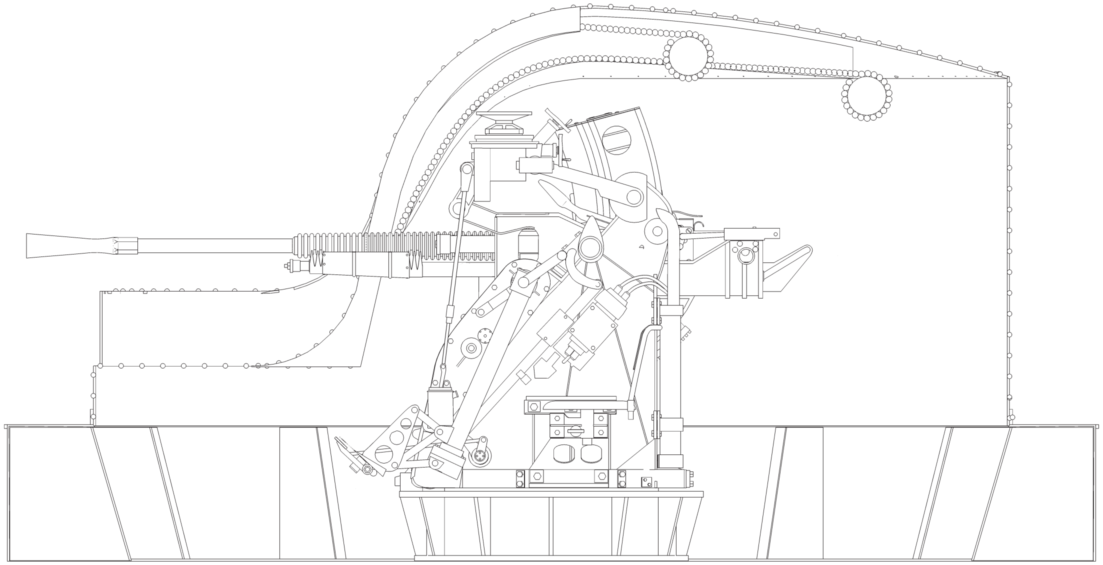
E2/10 PLAN

E2/11 INTERNAL PROFILE

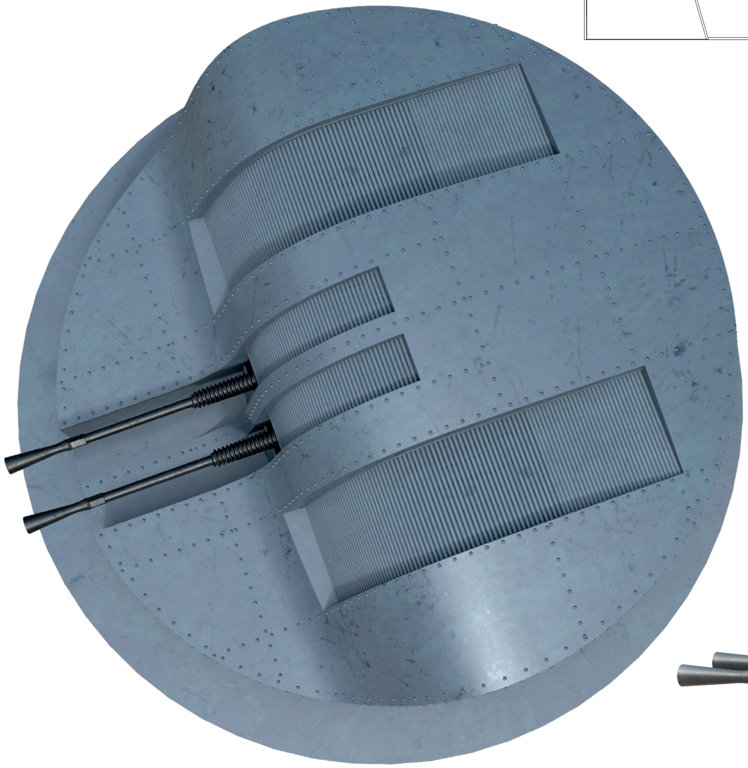


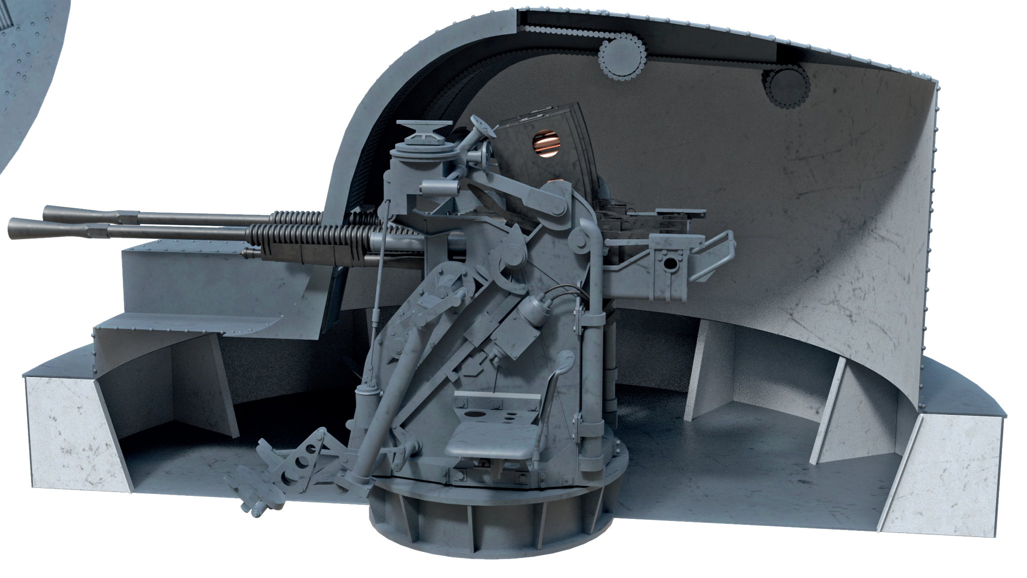


E2/10



E2/11





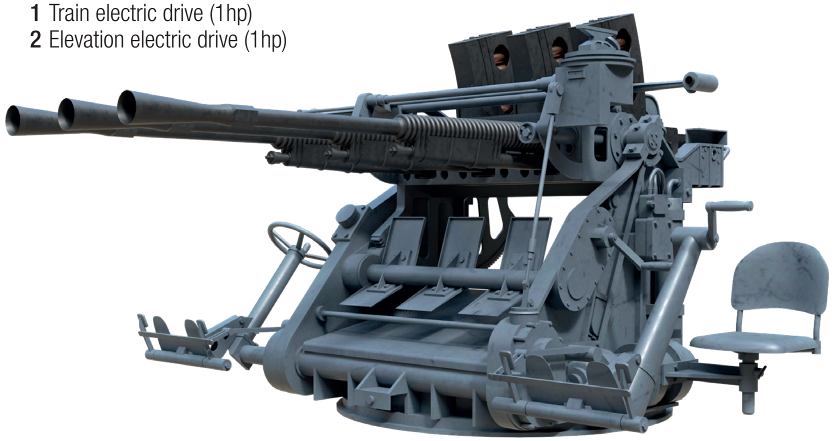
TYPE 96 25MM MACHINE GUNS IN A TRIPLE MOUNT (1/25 SCALE)

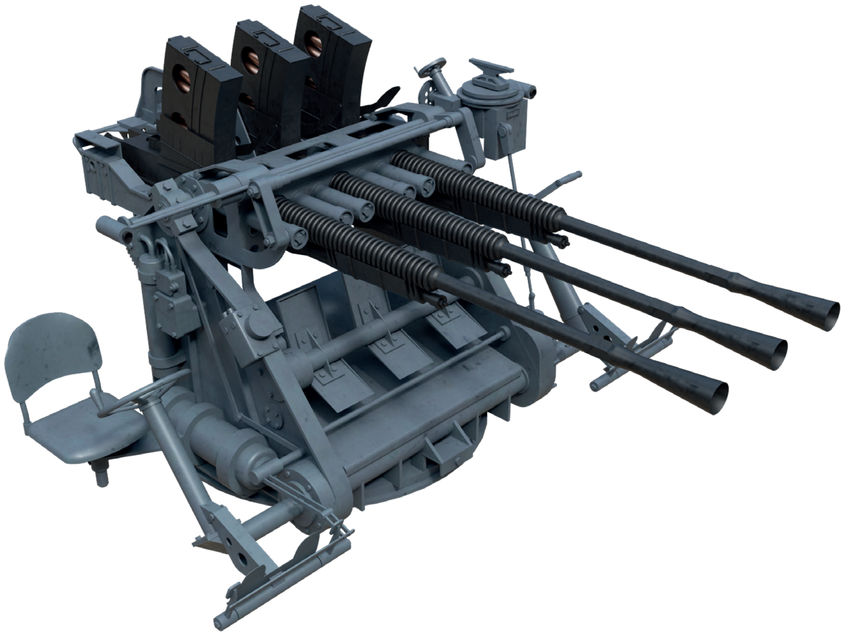
九六式25ミリ3連装機銃 – KUROKU SHIKI NIJŪ GO MIRI SAN RENSŌ KIJŪ

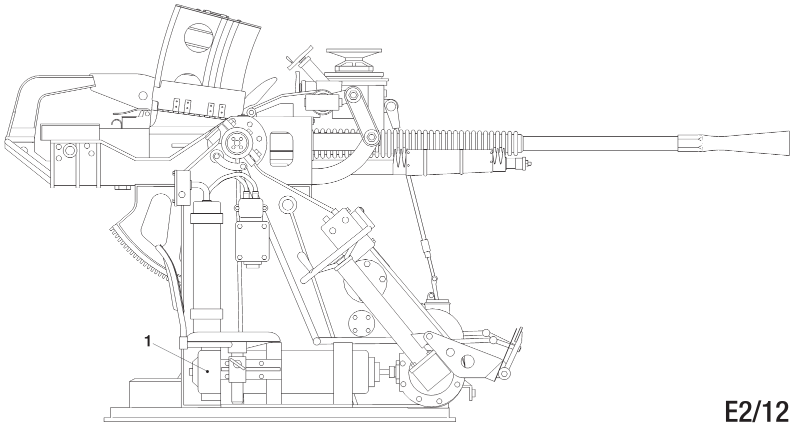
E2/12 RIGHT PROFILE
E2/13 LEFT PROFILE
E2/14 FRONT VIEW
E2/15 BACK VIEW
E2/16 PLAN

E2/12–16 25MM TRIPLE MOUNT

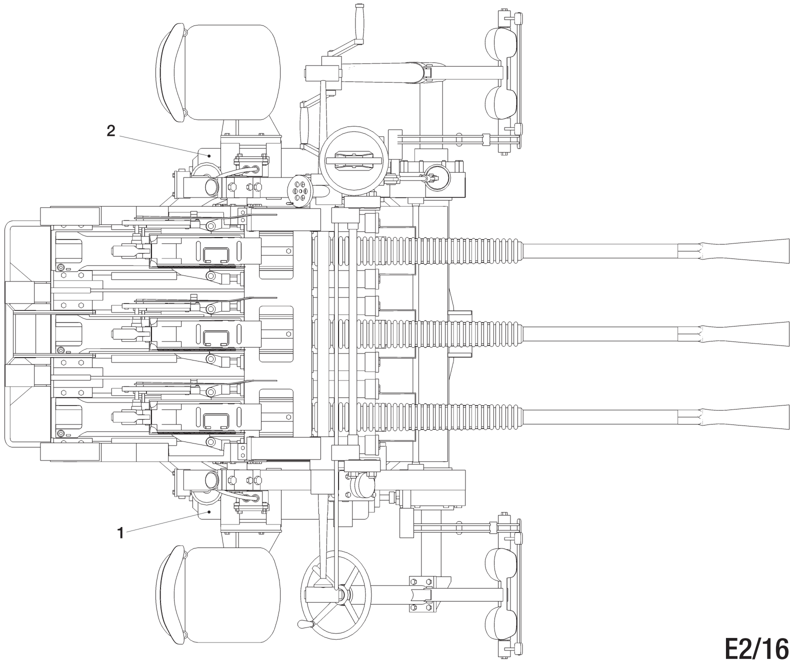
- **1** Train electric drive (1hp)
- **2** Elevation electric drive (1hp)



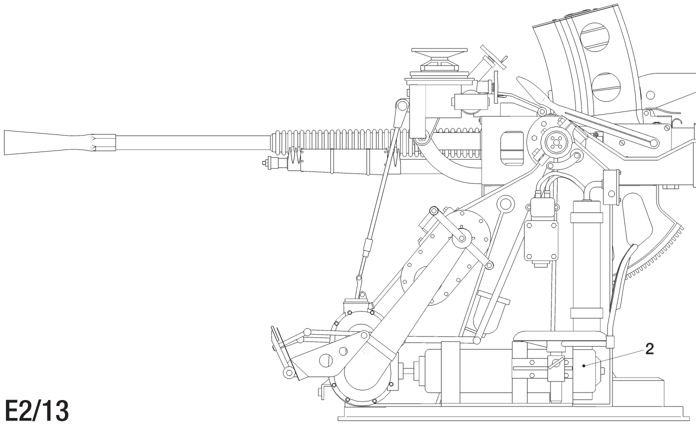




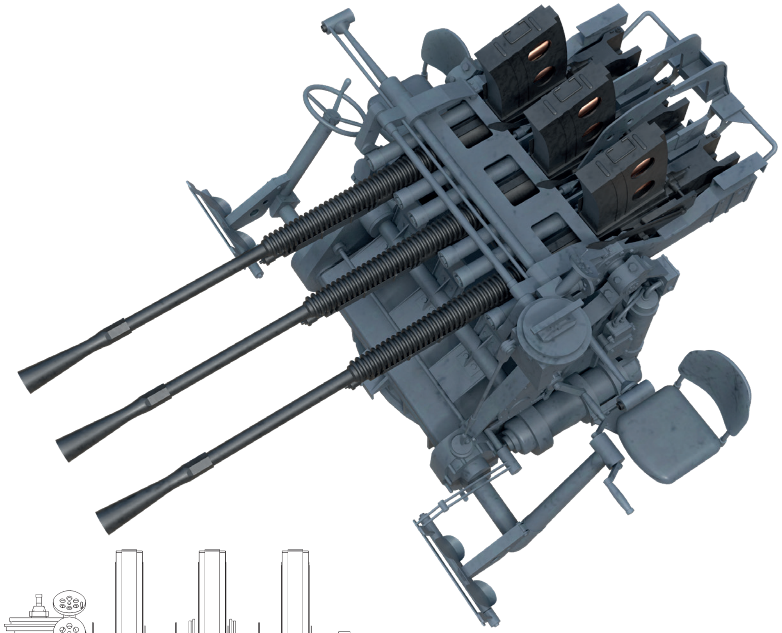
E2/12

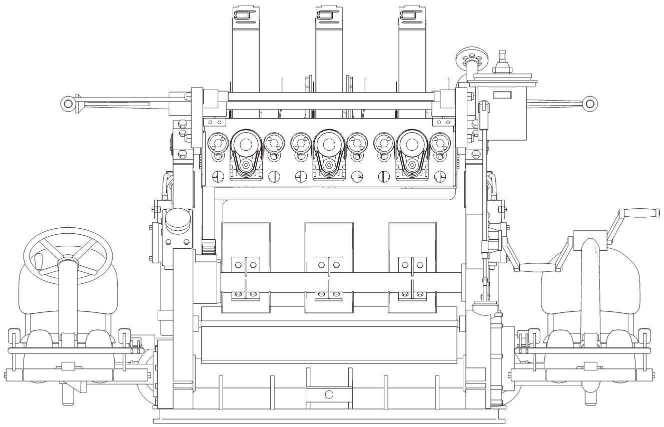


E2/16

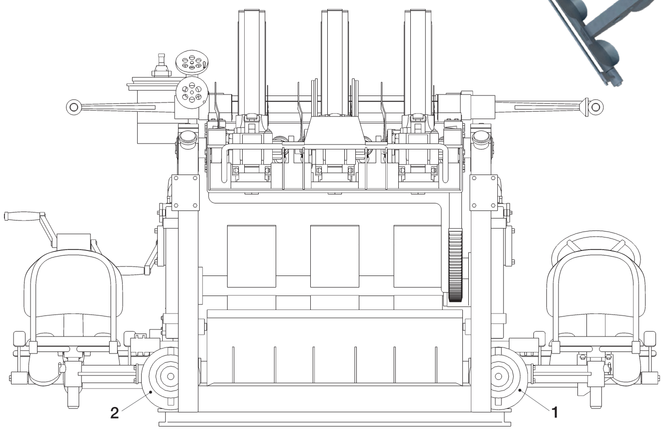


E2/13

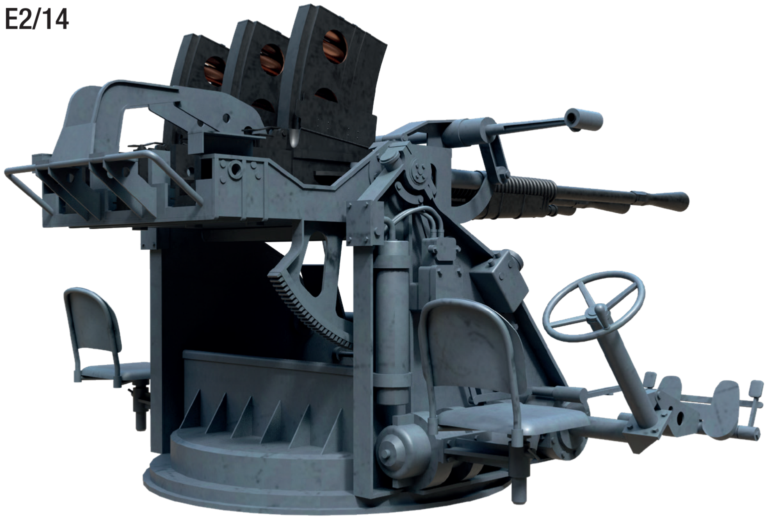


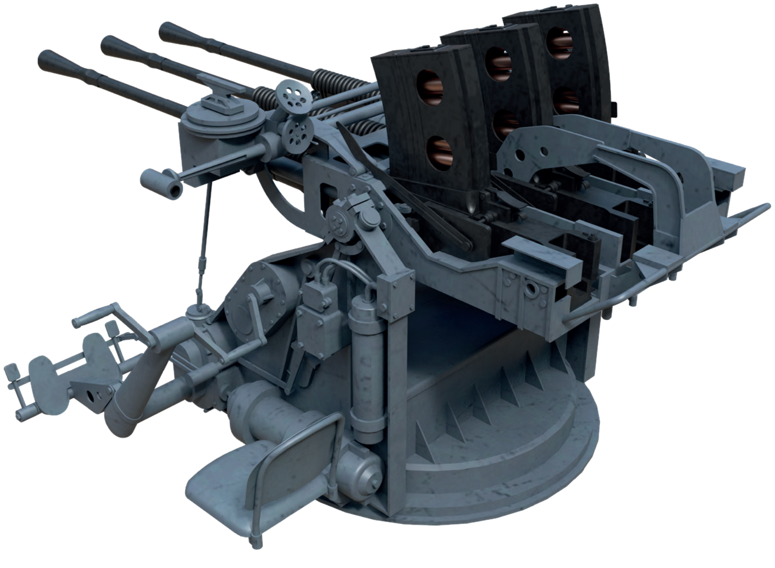


E2/14



E2/15



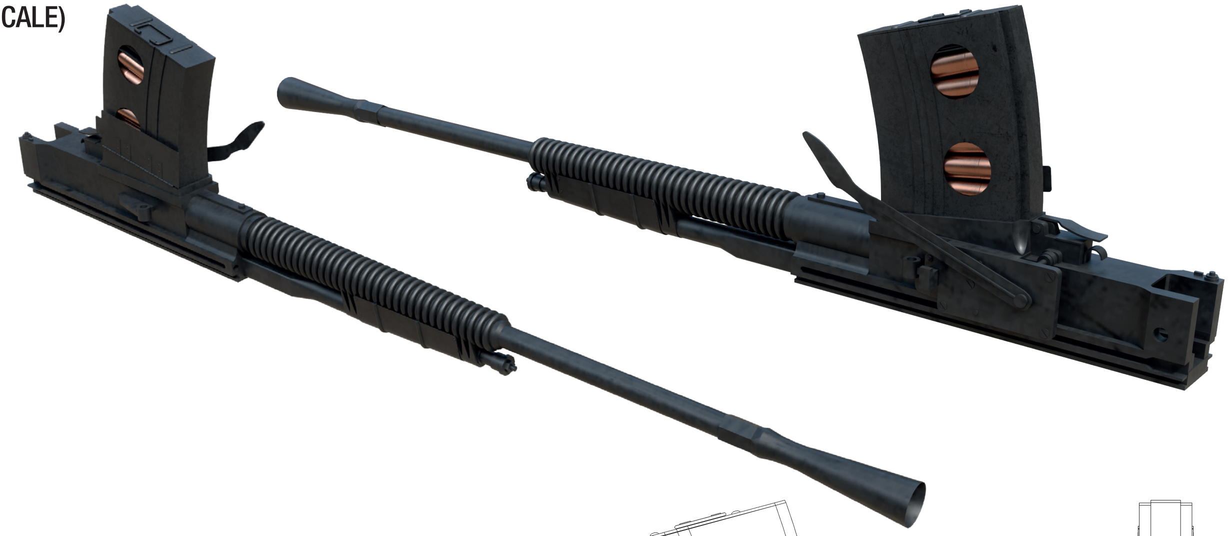


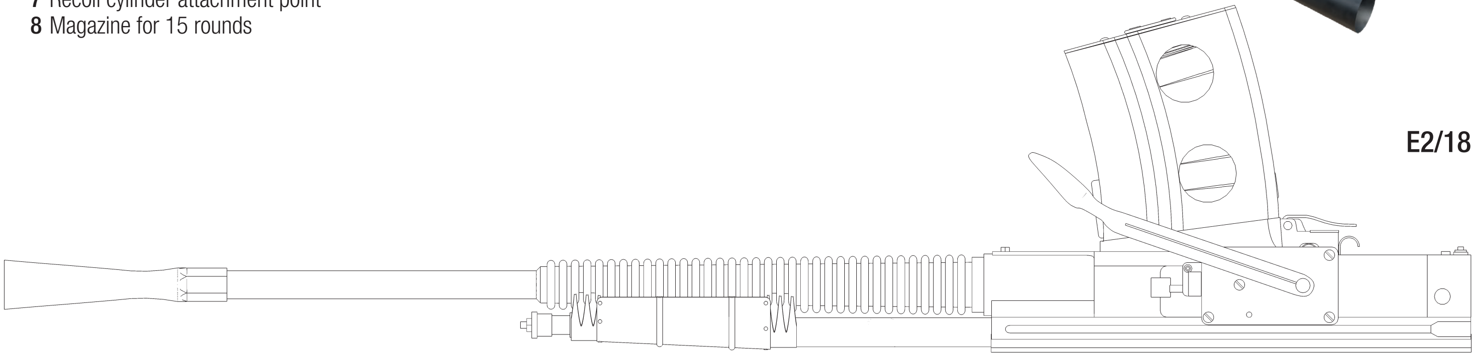
TYPE 96 25MM MACHINE GUN (1/12.5 SCALE)

E2/17 RIGHT PROFILE
E2/18 LEFT PROFILE
E2/19 FRONT VIEW
E2/20 BACK VIEW
E2/21 PLAN

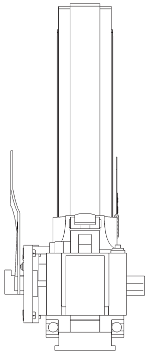
E2/17–21 25MM MACHINE GUN

- **1** Flash guard
- **2** Barrel
- **3** Radiator
- **4** Gas valve with shield
- **5** Operating lever
- **6** Slide rail
- **7** Recoil cylinder attachment point
- **8** Magazine for 15 rounds



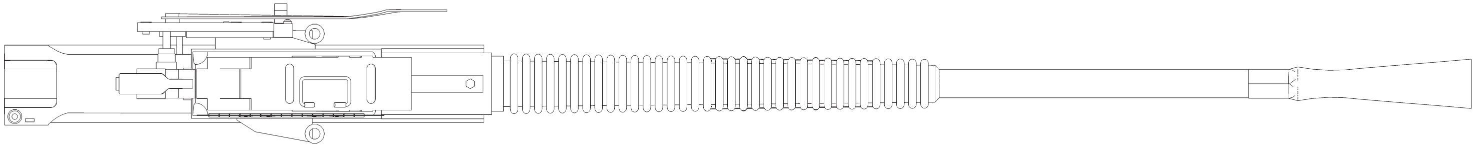


E2/18

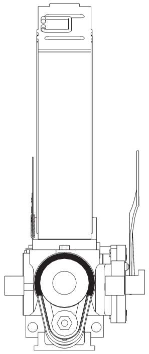


E2/20

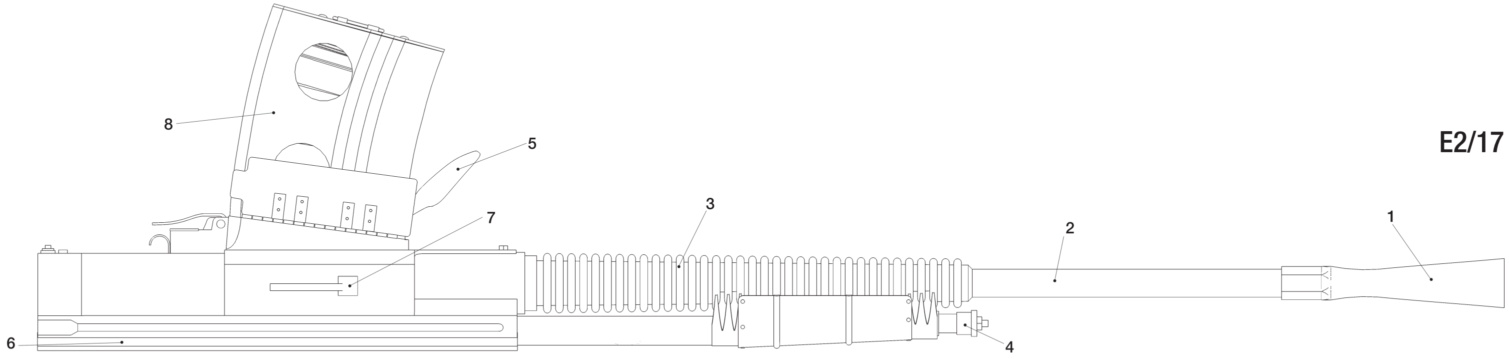
E2/21



E2/19



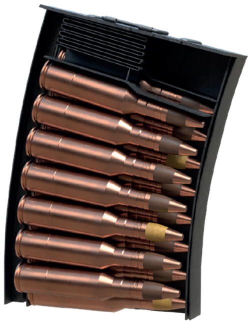
E2/17

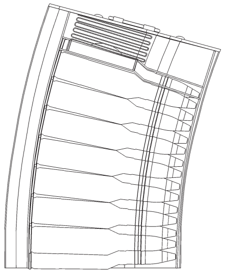


E2/22 MAGAZINE FOR 15 ROUNDS – INTERNAL PROFILE (1/12.5 SCALE)
E2/23 25MM PROJECTILE – PROFILE (1/4 SCALE)
E2/24 25MM COMPLETE ROUND – PROFILE (1/4 SCALE)

E2/25 25MM COMPLETE ROUND (TRACER) – SECTION (1/4 SCALE)

1 Primer
2 Propellant case
3 Propellant
4 Igniter
5 Illuminating powder
6 Fire transfer powder
7 Black powder
8 Projectile body
9 Projectile head
10 Rotating band





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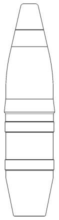

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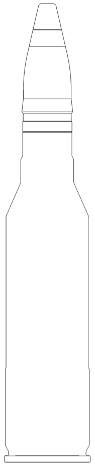
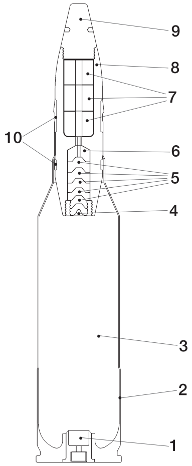


E2/24

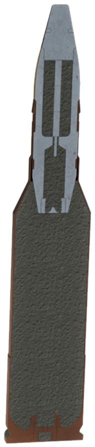


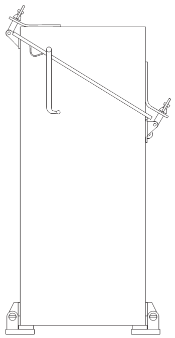
E2/25

25MM READY-TO-USE AMMUNITION BOX FOR 240 ROUNDS (1/25 SCALE)
E2/26 PROFILE
E2/27 FRONT VIEW
E2/28 PLAN

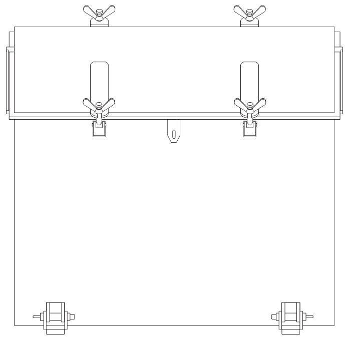
common projectile (painted brown)

tracer projectile (painted yellow)

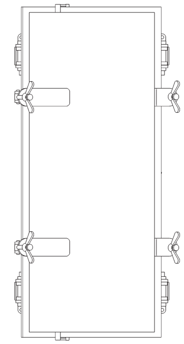




E2/26



E2/27

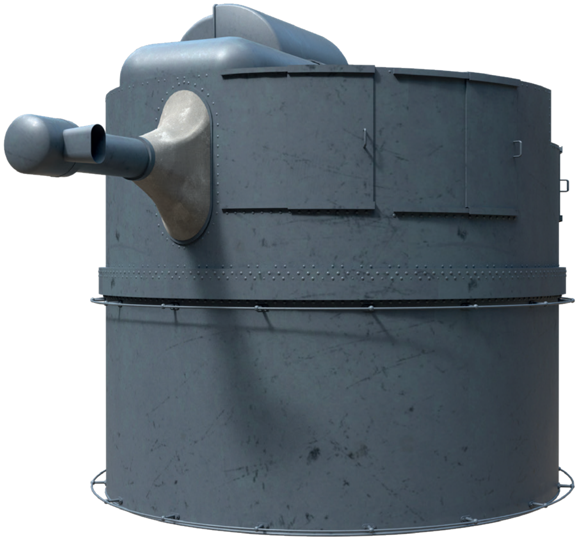


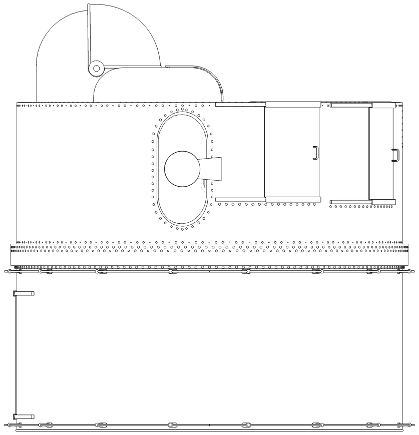
E2/28

TYPE 94 HIGH ANGLE FIRE CONTROL SYSTEM – GUN DIRECTOR (1/50 SCALE)

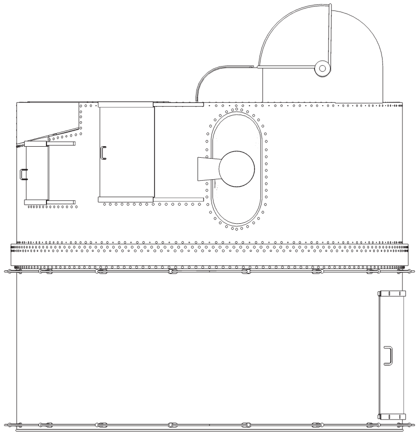
九四式高射装置の高射機 – KYŪYON SHIKI KŌSHA SŌCHI NO KŌSHAKI

F1/1 RIGHT PROFILE
F1/2 LEFT PROFILE
F1/3 FRONT VIEW

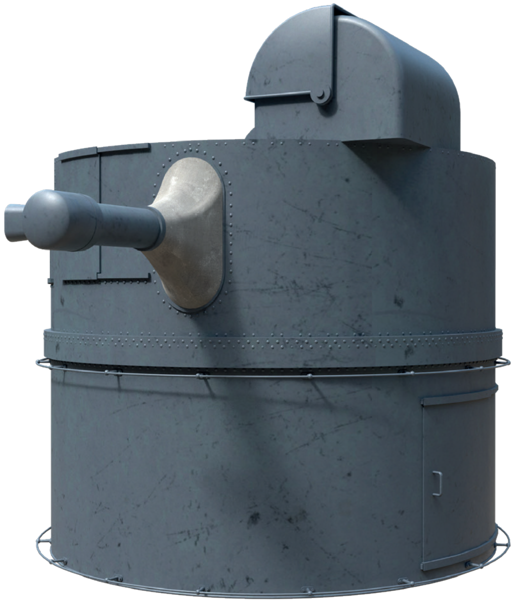


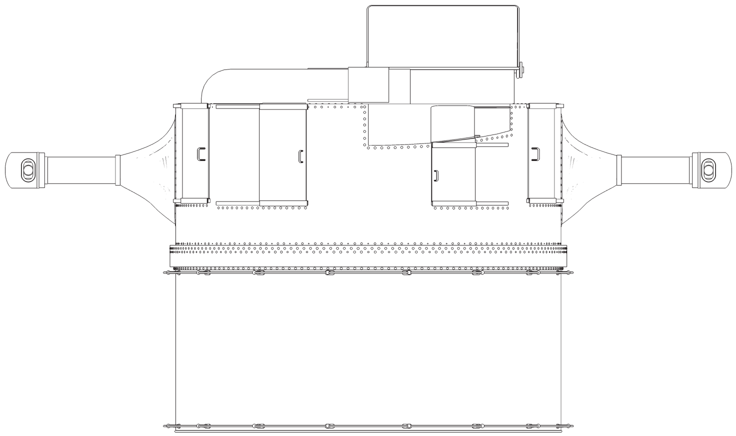


F1/1



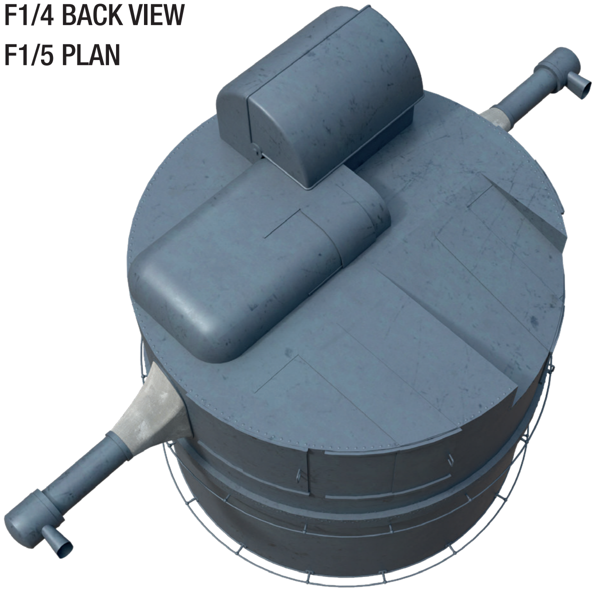
F1/2

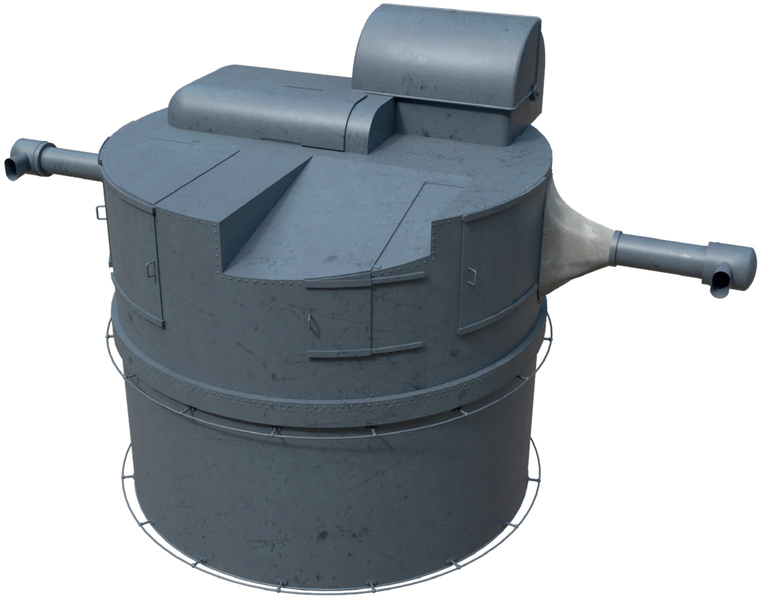


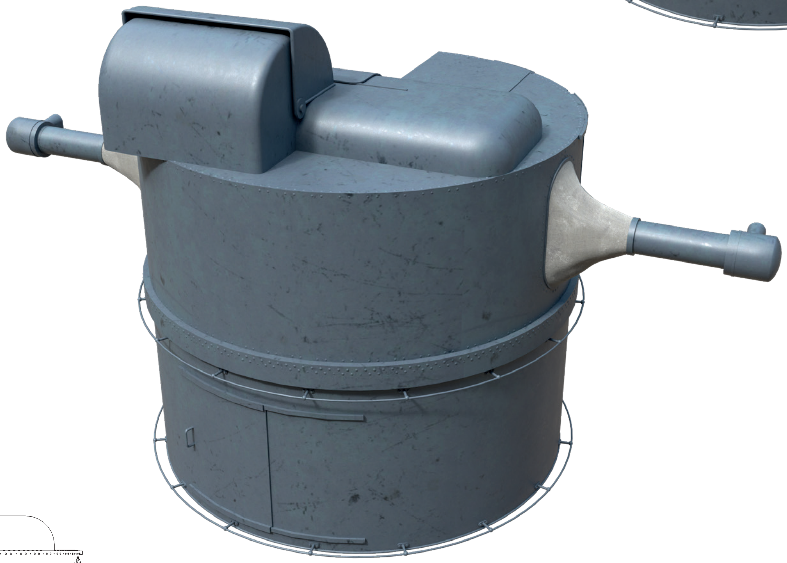


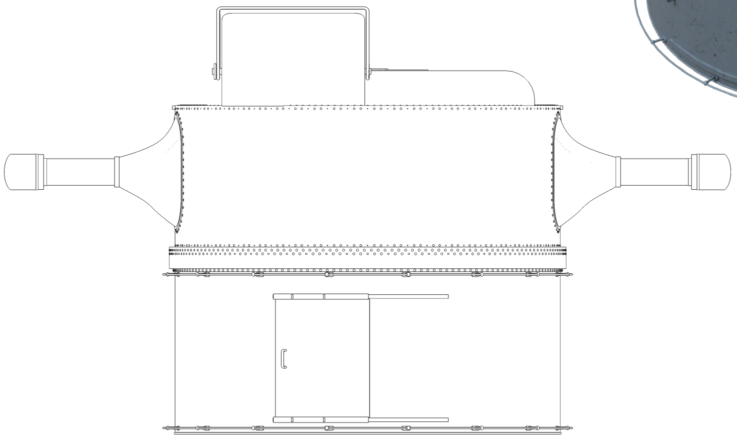
F1/3

F1/4 BACK VIEW
F1/5 PLAN









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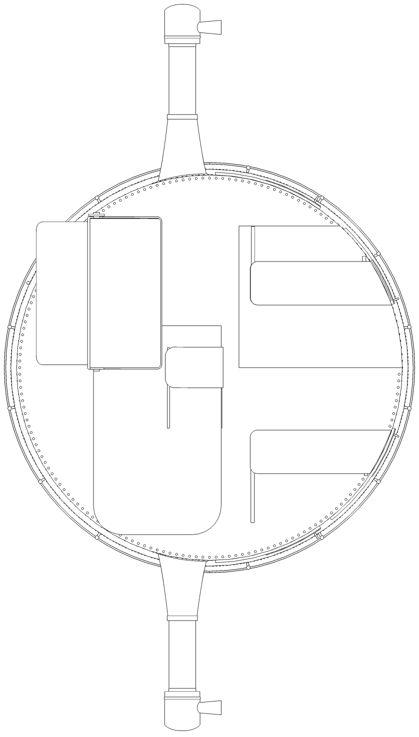


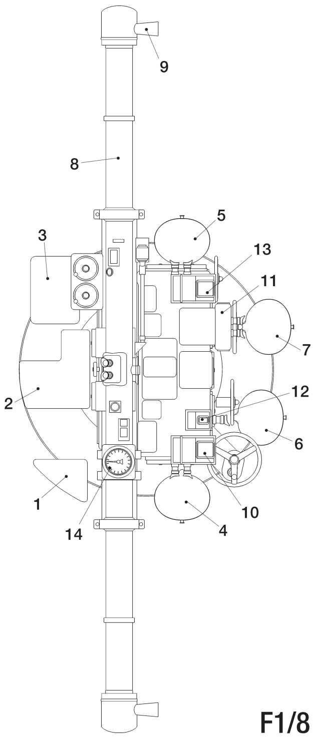
F1/5

TYPE 94 HIGH ANGLE FIRE CONTROL SYSTEM – GUN DIRECTOR INSIDE VIEWS (1/50 SCALE)

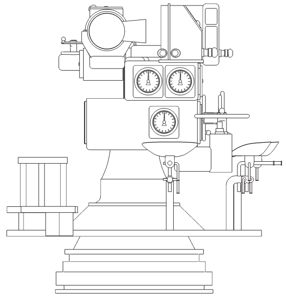
F1/6 PROFILE
F1/7 FRONT VIEW
F1/8 PLAN

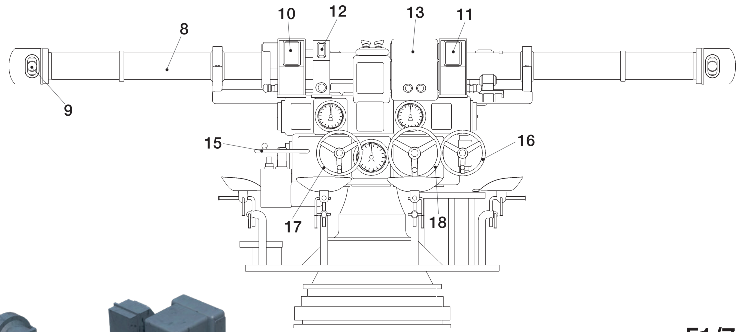
F1/6–8 TYPE 94 HIGH ANGLE GUN DIRECTOR INSIDE VIEWS

1 Range transmitter's platform
2 Rangefinder operator's platform
3 Spotter's platform
4 Trainer's seat
5 Pointer's seat
6 Vertical inclination spotter's seat
7 Lateral inclination spotter's seat
8 Rangefinder arm (4.5-metre base; cross levelling from -10º to +10º)
9 Rangefinder telescope
10 Train telescope
11 Elevation telescope
12 Vertical inclination telescope
13 Lateral inclination telescope
14 Range transmission apparatus
15 Trainer's handwheel
16 Pointer's handwheel
17 Vertical inclination handwheel
18 Lateral inclination handwheel

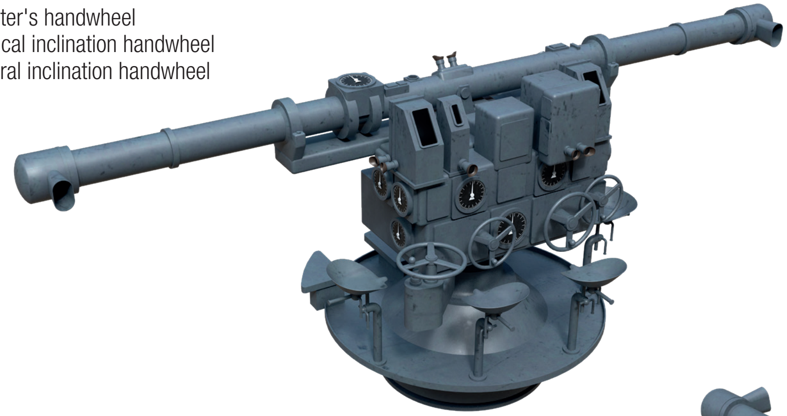


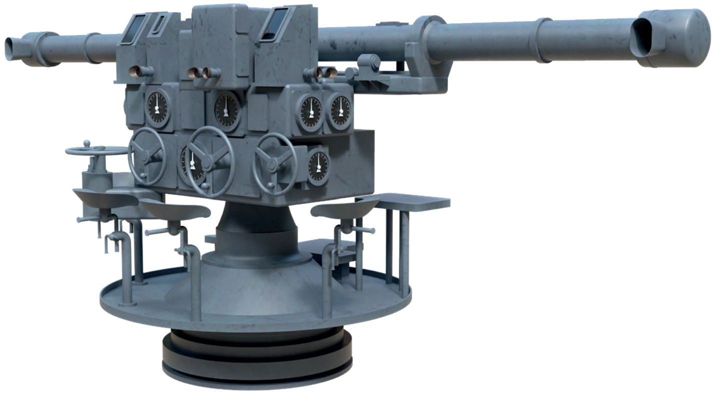
F1/8

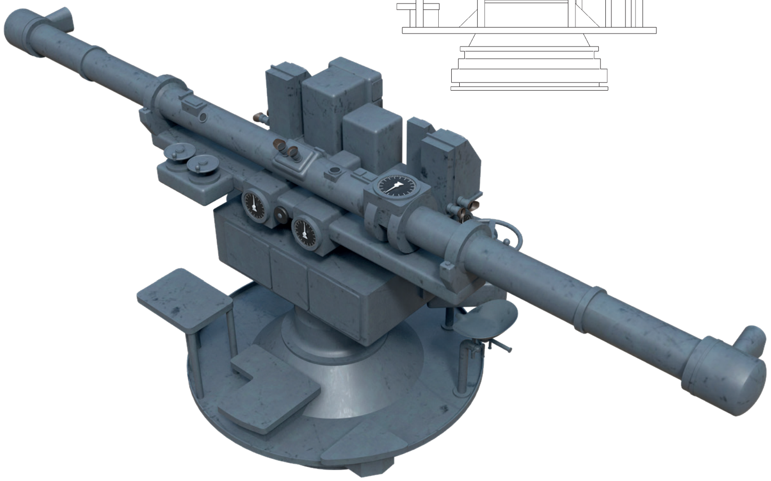

F1/6



F1/7







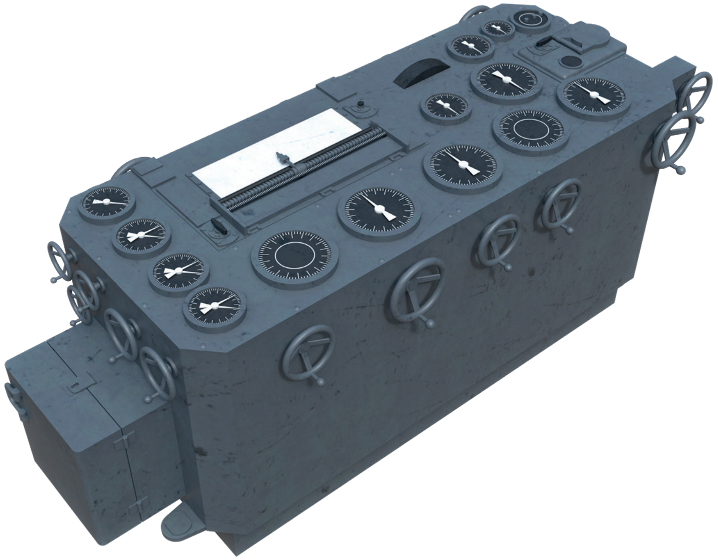
TYPE 94 HIGH ANGLE FIRE CONTROL SYSTEM – BELOW-DECKS MECHANICAL COMPUTER (1/50 SCALE)

九四式高射装置高射射撃盤 – KYŪYON SHIKI KŌSHA SŌCHI KŌSHA SHAGEKIBAN

F1/9 PROFILE

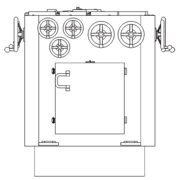
F1/10 FRONT VIEW

F1/11 PLAN

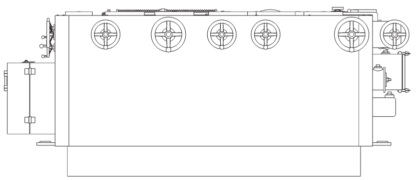


F1/9–11 TYPE 94 FIRE CONTROL SYSTEM MECHANICAL COMPUTER

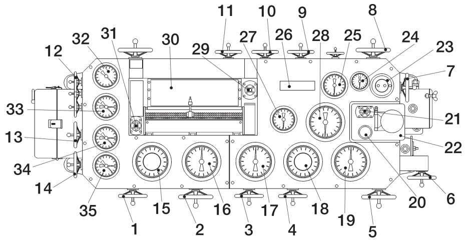
1 Vertical deflection handwheel
2 Elevation handwheel
3 Train handwheel
4 Lateral deflection handwheel
5 Compass bearing handwheel
6 Lateral inclination correction handwheel
7 Vertical inclination correction handwheel
8 Time fuse handwheel
9 Target level correction handwheel
10 Range handwheel
11 Range change rate handwheel
12 Range correction handwheel
13 Own speed handwheel
14 Parallax correction handwheel
15 Vertical deflection balancing wheel
16 Elevation angle dial
17 Train angle dial
18 Lateral deflection balancing wheel
19 Compass repeater
20 Projector lamp
21 Lamp switch
22 Correction projector
23 Fuse reader
24 Fuse correction dial
25 Target level correction dial
26 Range drum
27 Range change rate dial
28 Fuse dial
29 Range mark push button
30 Range change rate chart
31 Illumination switch
32 Range dial
33 Range correction dial
34 Own speed correction dial
35 Parallax dial



F1/10



F1/9

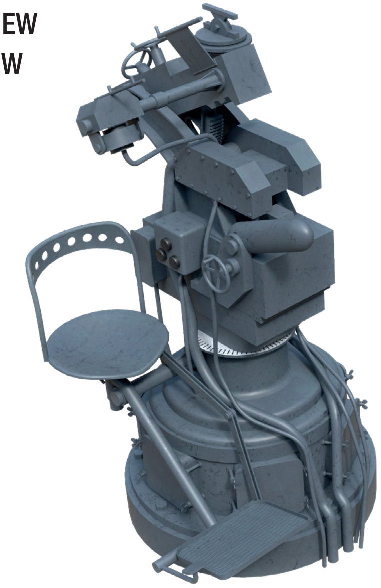


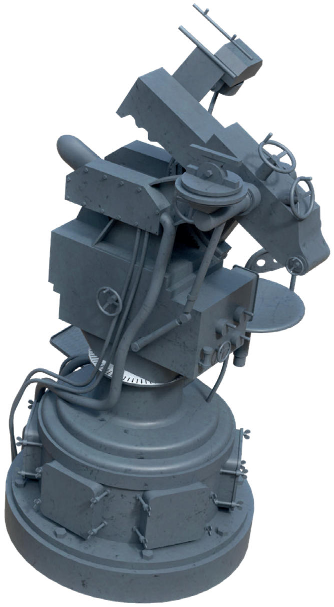
F1/11

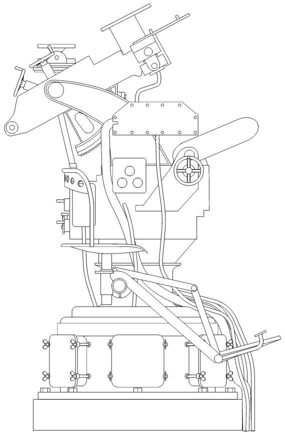
TYPE 95 MACHINE GUN FIRE DIRECTOR (1/25 SCALE)

九五式機銃射撃装置 – KYŪGO SHIKI KIJŪ SHAGEKI SŌCHI

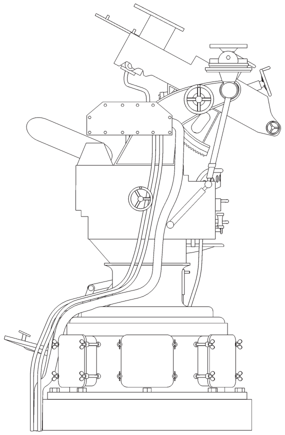
F1/12 RIGHT PROFILE
F1/13 LEFT PROFILE
F1/14 FRONT VIEW
F1/15 BACK VIEW
F1/16 PLAN



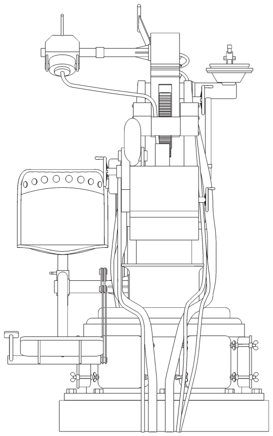




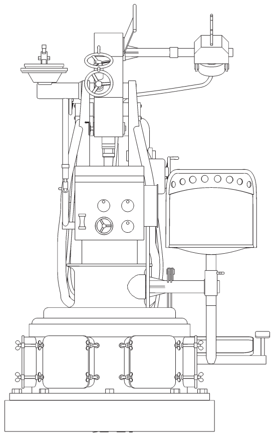
F1/12



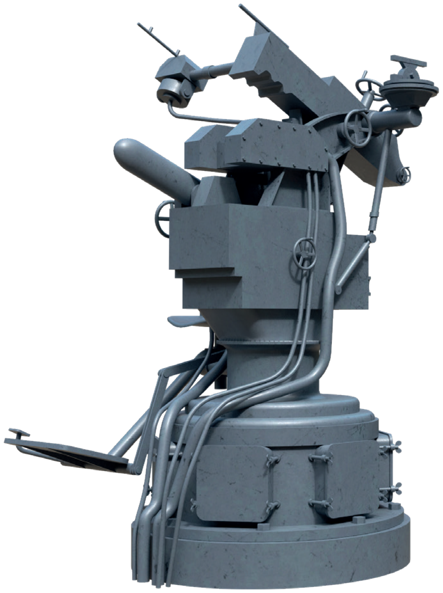
F1/13

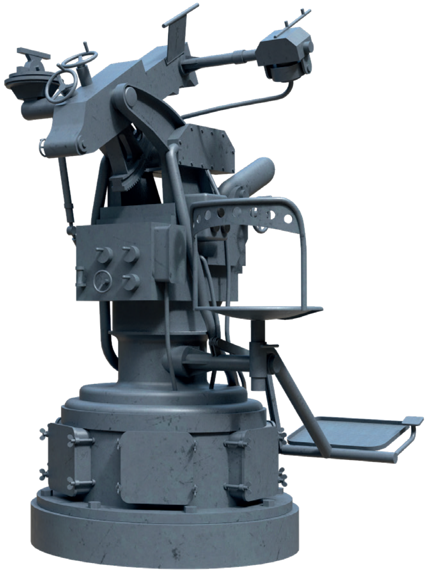


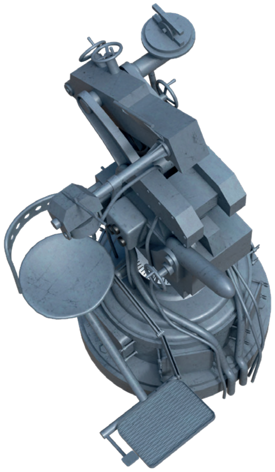
F1/14

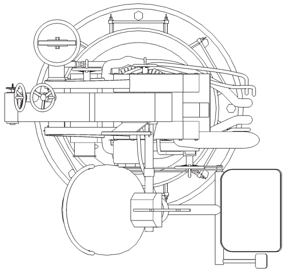


F1/15





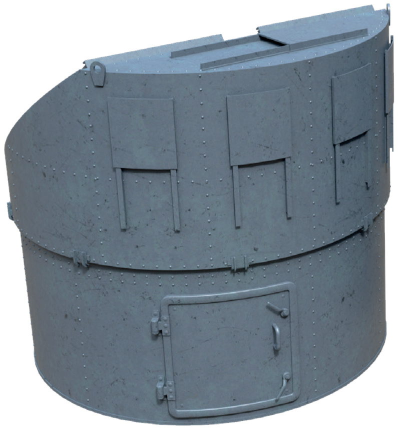


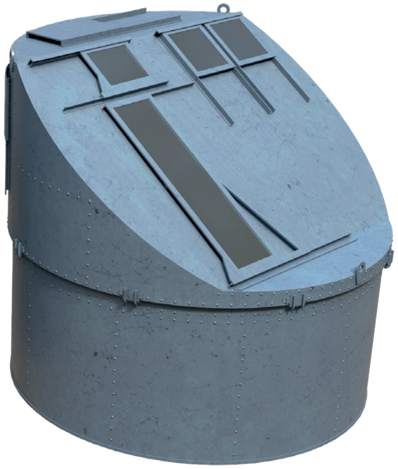


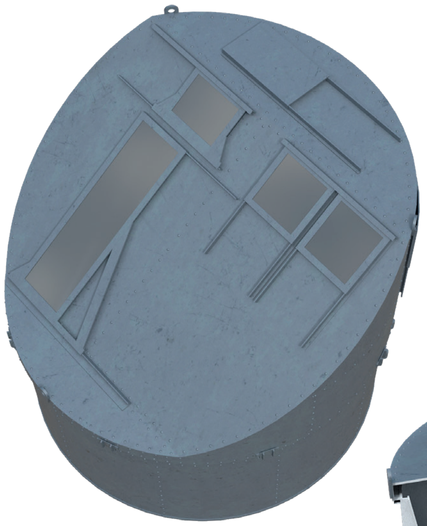
F1/16

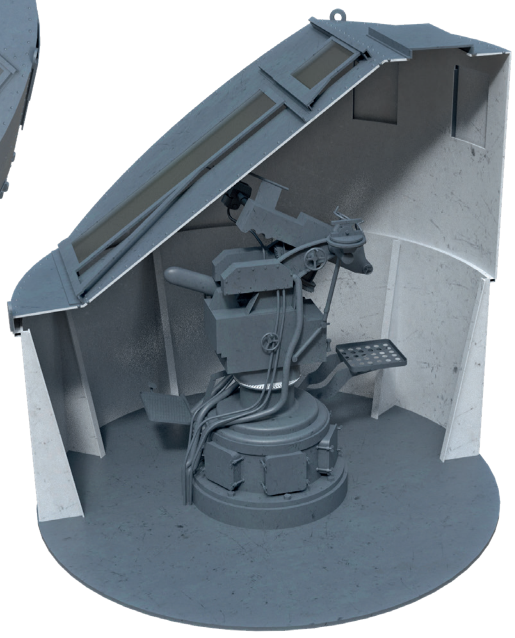
TYPE 95 MACHINE GUN FIRE DIRECTOR WITH SHIELD (1/50 SCALE)

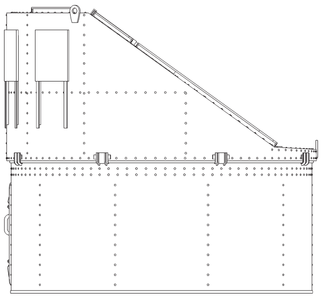
F1/17 RIGHT PROFILE
F1/18 LEFT PROFILE
F1/19 FRONT VIEW
F1/20 BACK VIEW
F1/21 PLAN
F1/22 INTERNAL PROFILE



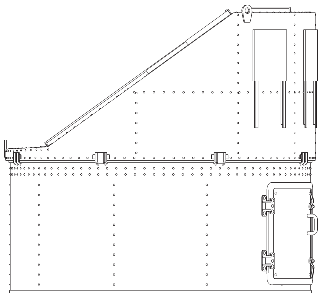




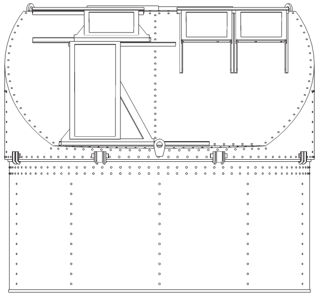




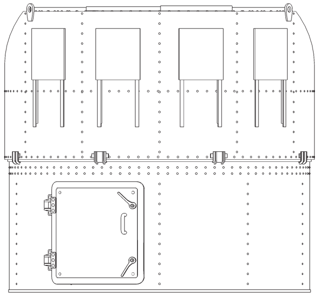
F1/17



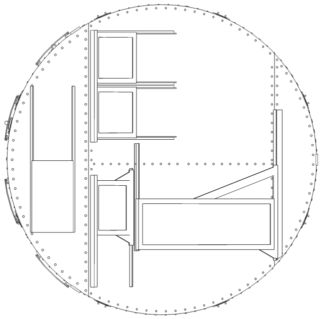
F1/18



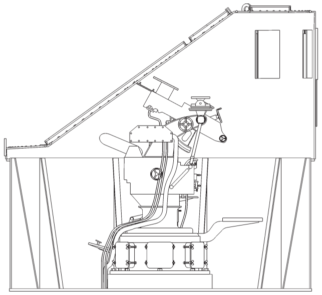
F1/19



F1/20



F1/21

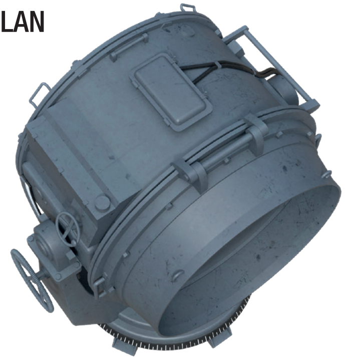


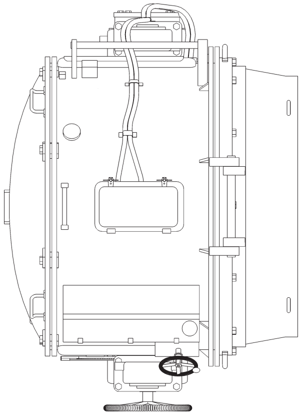
F1/22

TYPE 92 110CM SEARCHLIGHT (1/37.5 SCALE)

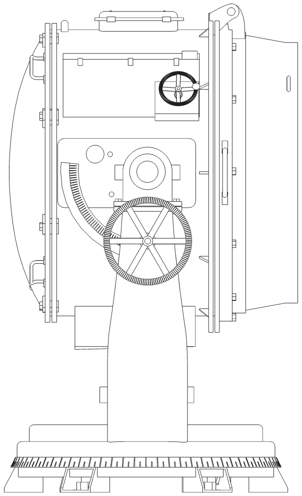
九二式110センチ探照灯 – KYŪNI SHIKI HYAKU JŪ SENCHI TANSHŌTŌ

F2/1 RIGHT PROFILE
F2/2 LEFT PROFILE
F2/3 FRONT VIEW
F2/4 BACK VIEW
F2/5 PLAN

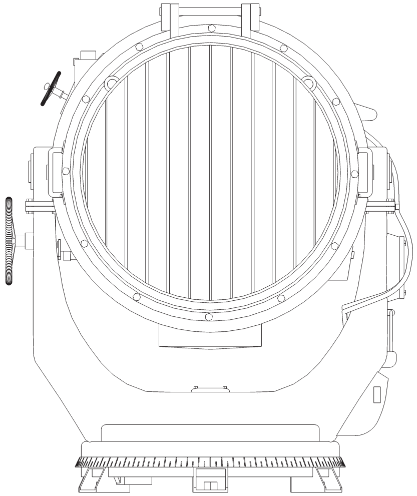




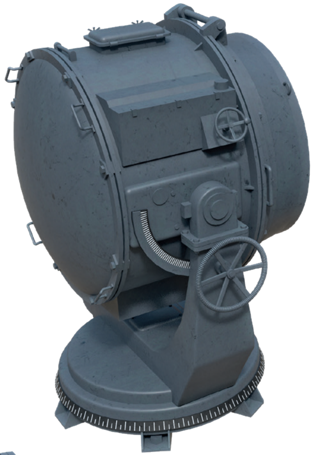
F2/5

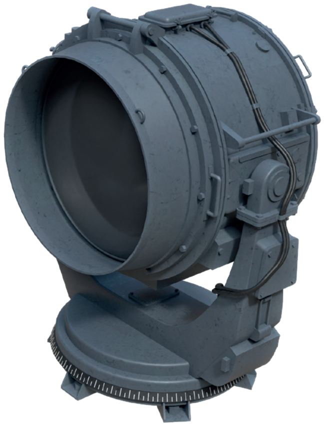


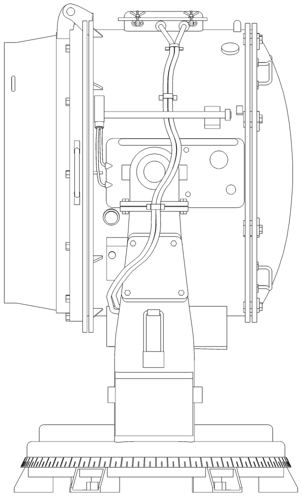
F2/1



F2/3







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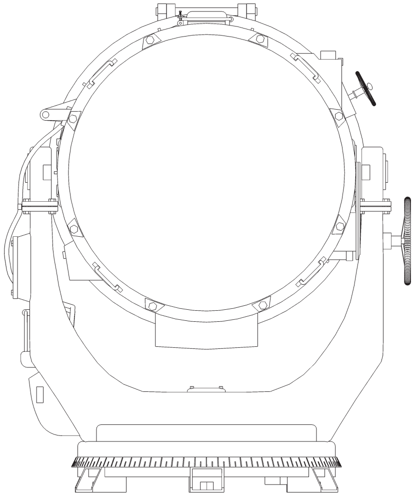

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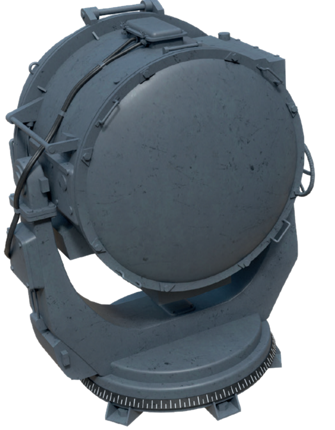
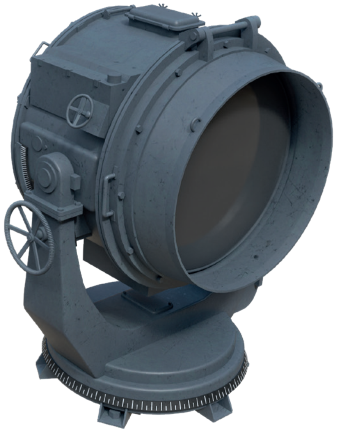
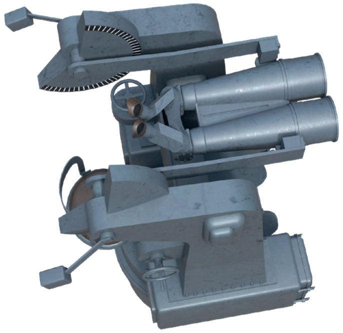


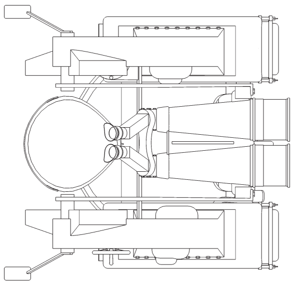


TYPE 94 SEARCHLIGHT DIRECTOR AND HIGH ANGLE BINOCULAR LOOKOUT (1/25 SCALE)

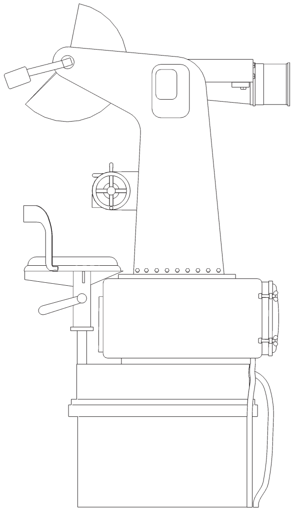
九四式探照灯管制器兼上空見張方向盤 – KYŪYON SHIKI TANSHŌTŌ KANSEIKI KEN JŌKŪ MIHARI HŌKŌBAN

F2/6 RIGHT PROFILE
F2/7 LEFT PROFILE
F2/8 FRONT VIEW
F2/9 BACK VIEW
F2/10 PLAN

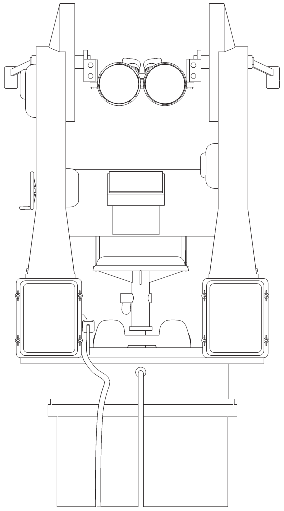




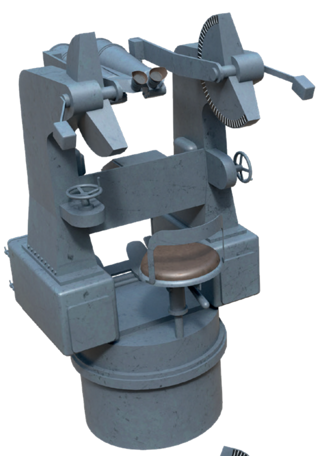
F2/10

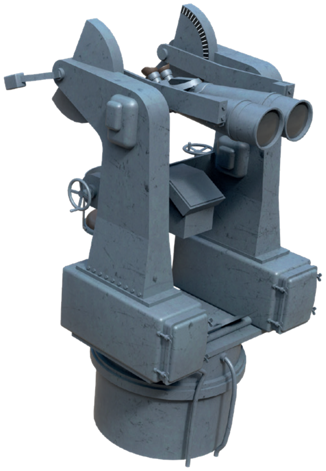


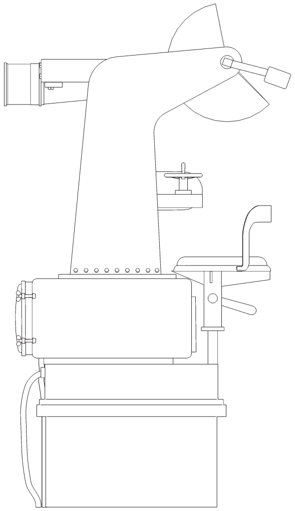
F2/6



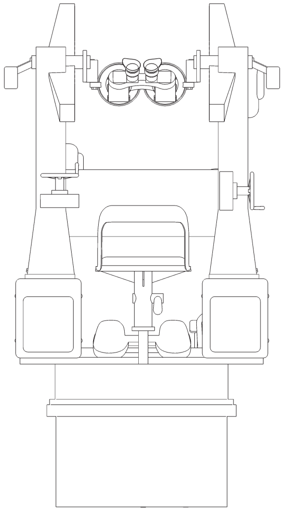
F2/8



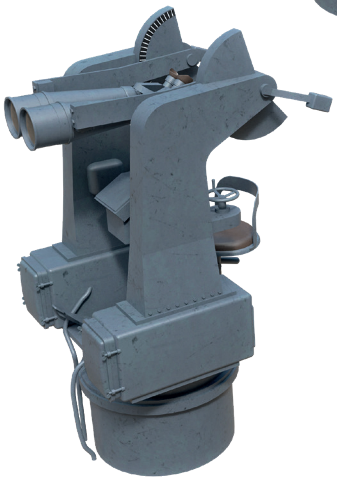


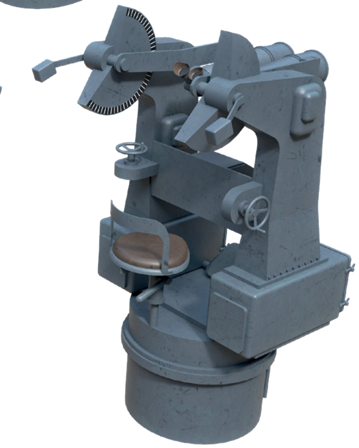


F2/7



F2/9

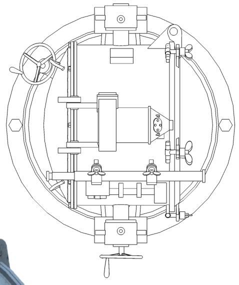




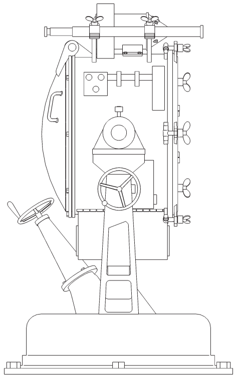
60CM SIGNAL SEARCHLIGHT (1/37.5 SCALE)

60センチ信号用探照灯 – ROKUJŪ SENCHI SHINGŌYŌ TANSHŌTŌ

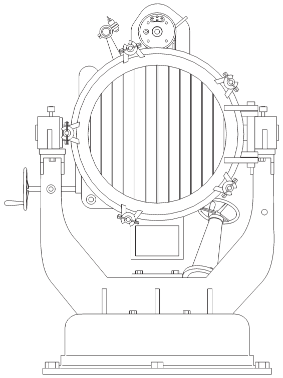
F2/11 RIGHT PROFILE
F2/12 LEFT PROFILE
F2/13 FRONT VIEW
F2/14 BACK VIEW
F2/15 PLAN



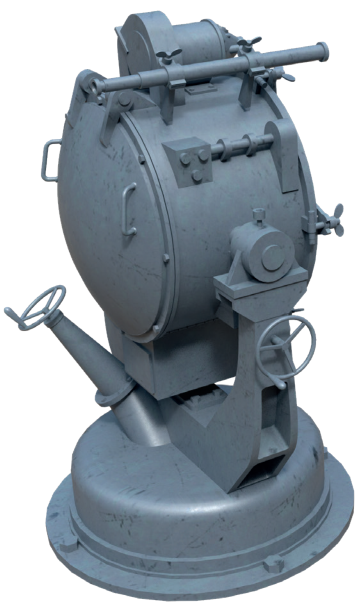
F2/15

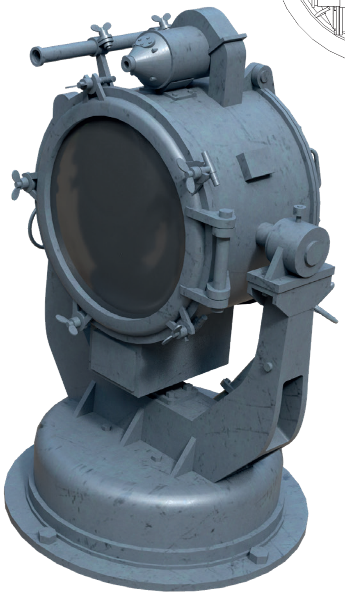


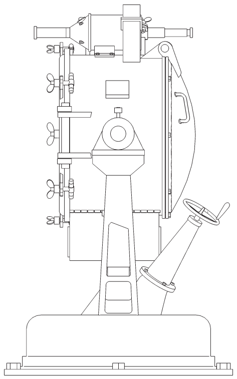
F2/11



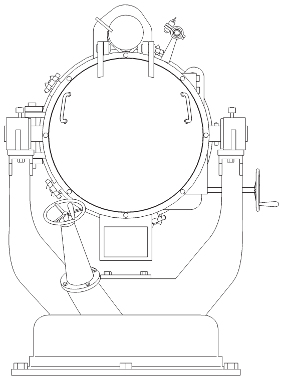
F2/13



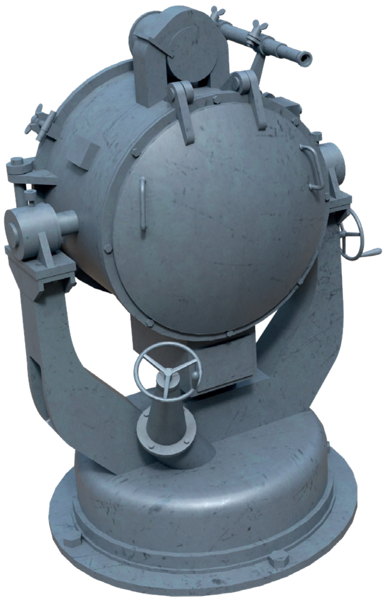


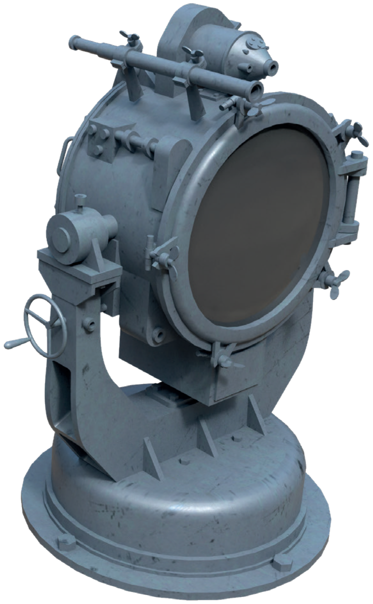


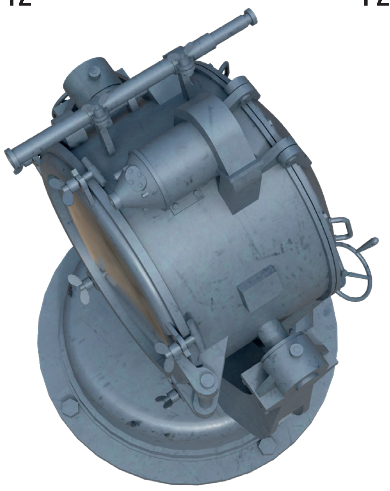
F2/12



F2/14



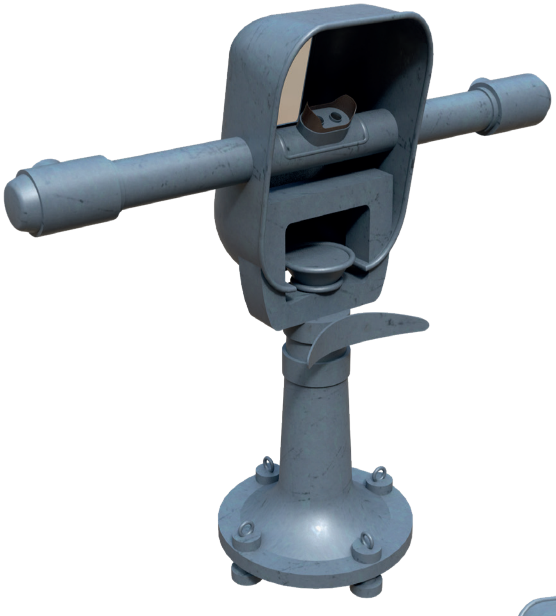


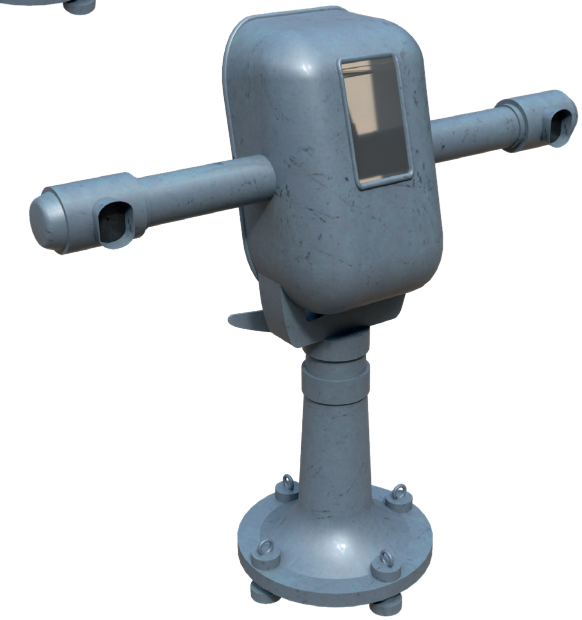


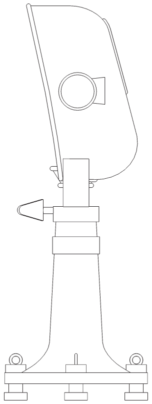
1.5-METRE RANGEFINDER (1/37.5 SCALE)

1.5メートル測距儀 – ICHI TEN GO MĒTORU SOKKYOGI

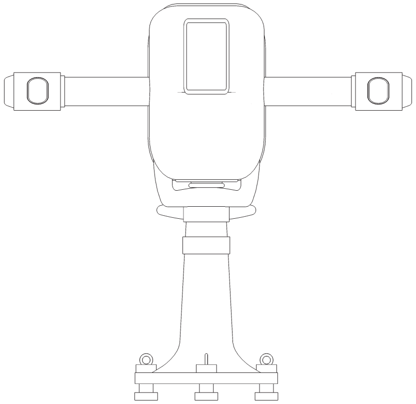
F2/16 PROFILE
F2/17 FRONT VIEW
F2/18 BACK VIEW
F2/19 PLAN







F2/16



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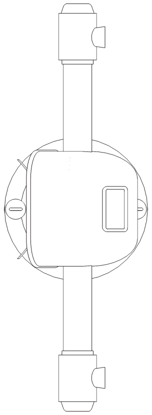
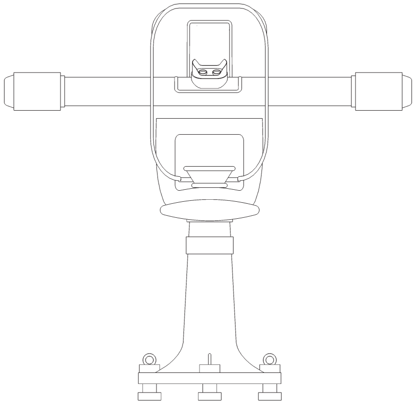


F2/19

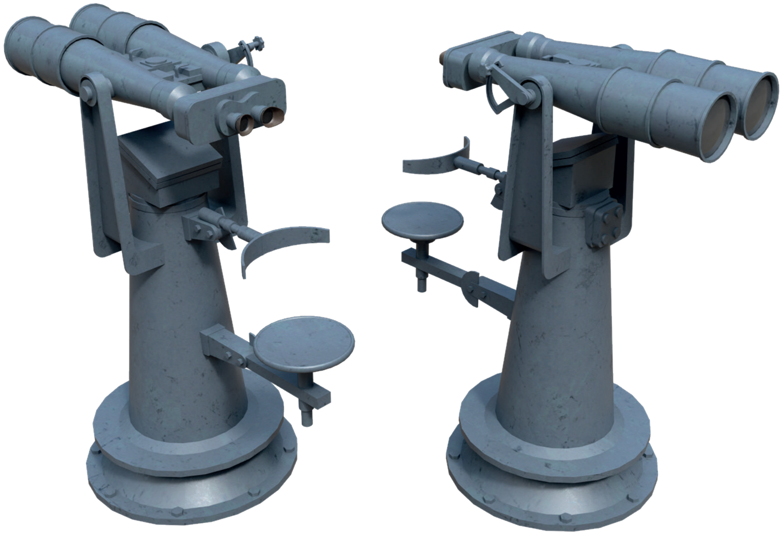


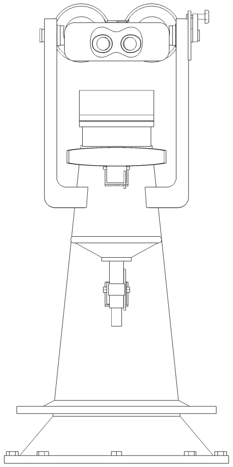
F2/18

18CM LOW-ANGLE BINOCULAR MOUNTING (1/25 SCALE)

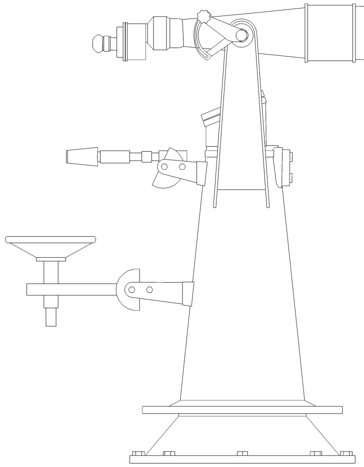
18センチ双眼望遠鏡 – JŪ HACHI SENCHI SŌGAN BŌENKYŌ

F2/20 PROFILE
F2/21 BACK VIEW
F2/22 PLAN

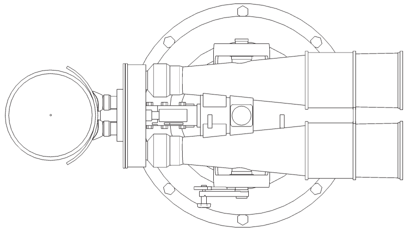




F2/21



F2/20

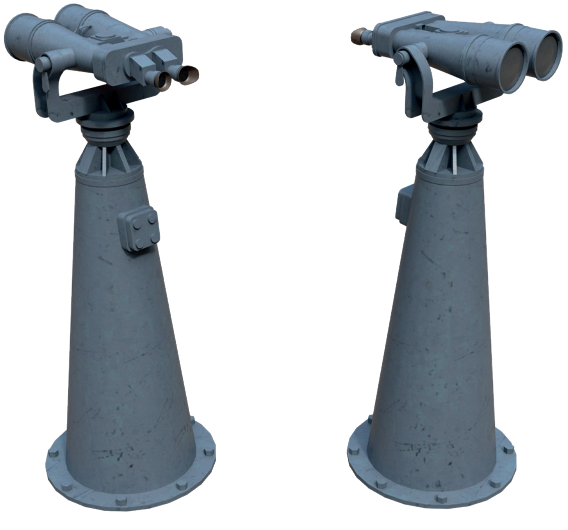


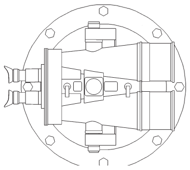
F2/22

12CM LOW-ANGLE BINOCULAR MOUNTING (1/25 SCALE)

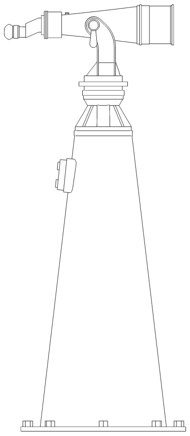
12センチ双眼望遠鏡 – JŪ NI SENCHI SŌGAN BŌENKYŌ

F2/23 PROFILE
F2/24 BACK VIEW
F2/25 PLAN

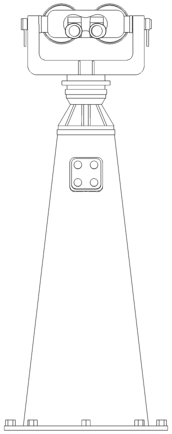




F2/25



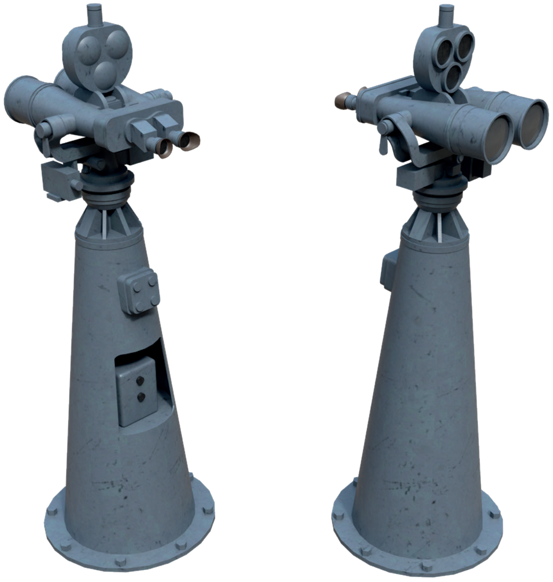
F2/23

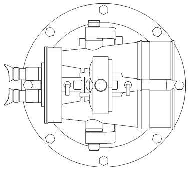


F2/24

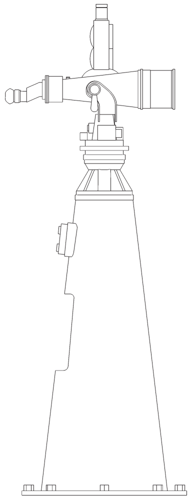
12CM LOW-ANGLE BINOCULAR MOUNTING FITTED WITH A YAMAKAWA LIGHT – INFRARED COMMUNICATIONS DEVICE (1/25 SCALE)

F2/26 PROFILE
F2/27 BACK VIEW
F2/28 PLAN

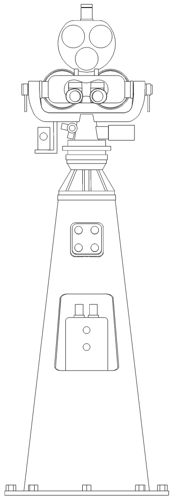




F2/28



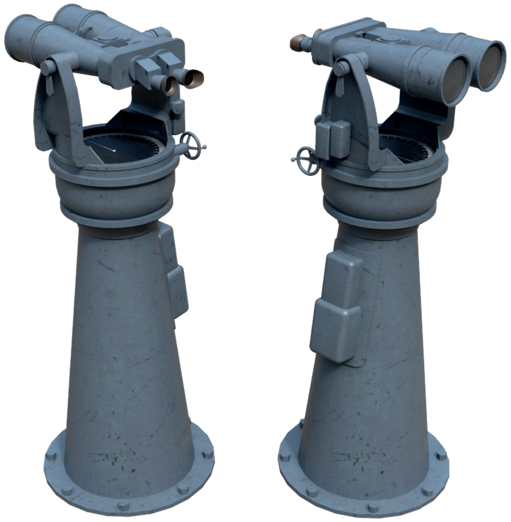
F2/26

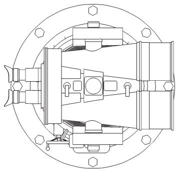


F2/27

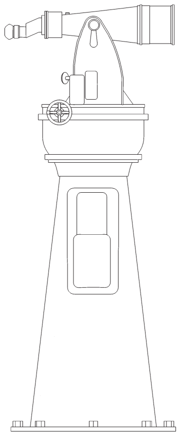
12CM LOW-ANGLE BINOCULAR MOUNTING FITTED WITH A COMPASS (1/25 SCALE)

F2/29 PROFILE
F2/30 BACK VIEW
F2/31 PLAN

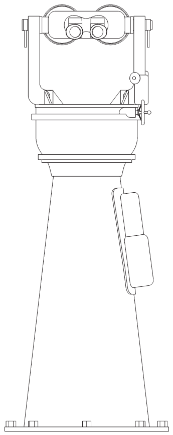




F2/31



F2/29

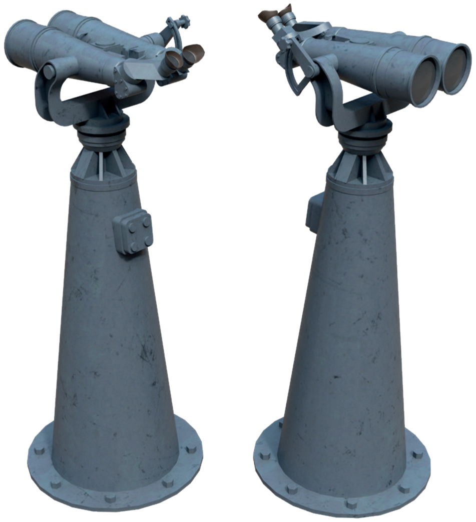


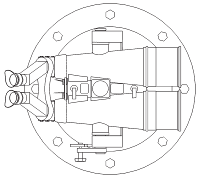
F2/30

12CM HIGH ANGLE BINOCULAR MOUNTING (1/25 SCALE)

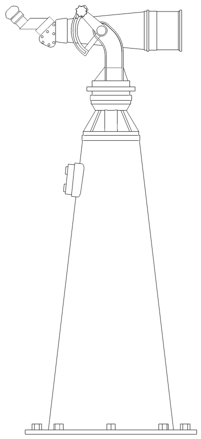
12センチ高角双眼望遠鏡 – JŪ NI SENCHI KŌKAKU SŌGAN BŌENKYŌ

F2/32 PROFILE
F2/33 BACK VIEW
F2/34 PLAN

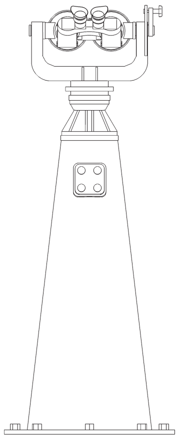




F2/34



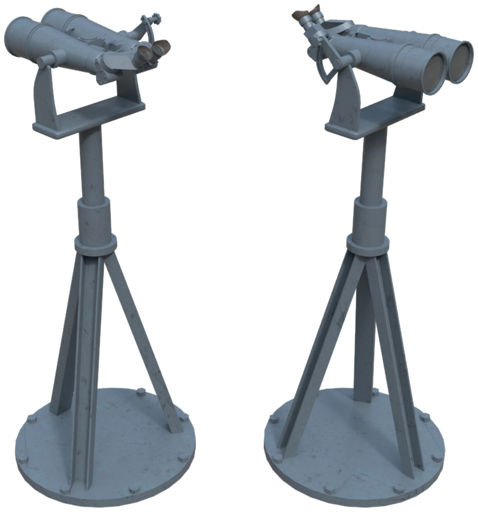
F2/32

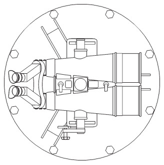


F2/33

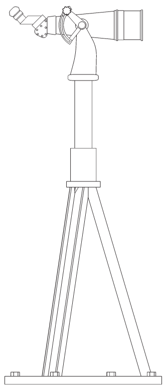
8CM HIGH ANGLE BINOCULAR MOUNTING (1/25 SCALE)

F2/35 PROFILE
F2/36 BACK VIEW
F2/37 PLAN

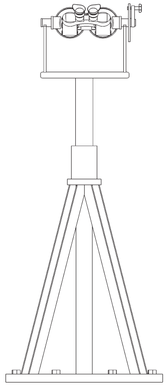




F2/37



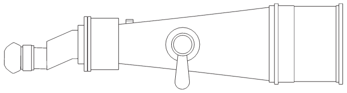
F2/35



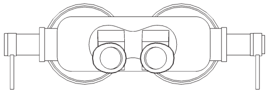
F2/36

12CM LOW-ANGLE BINOCULARS (1/12.5 SCALE)

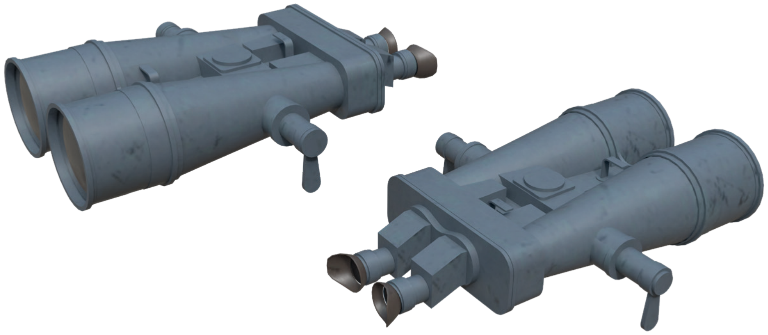
F2/38 PROFILE
F2/39 BACK VIEW
F2/40 PLAN

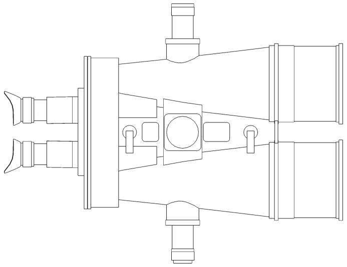


F2/38



F2/39

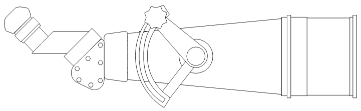




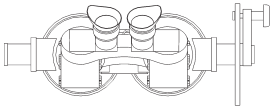
F2/40

12CM HIGH ANGLE BINOCULARS (1/12.5 SCALE)

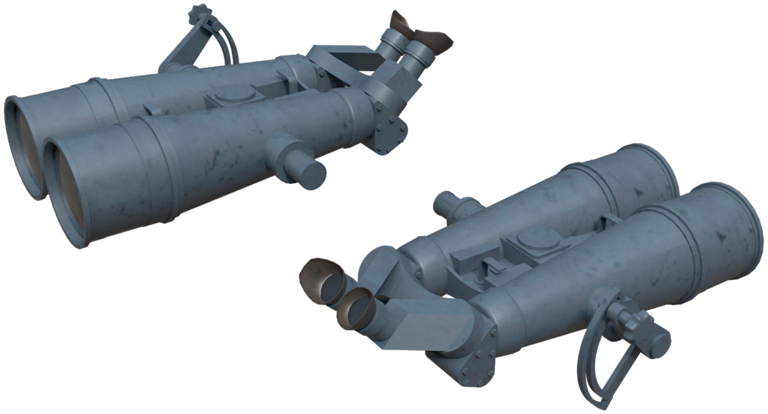
F2/41 PROFILE
F2/42 BACK VIEW
F2/43 PLAN

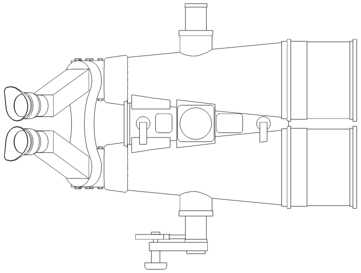


F2/41



F2/42

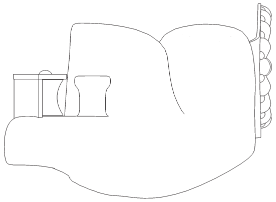




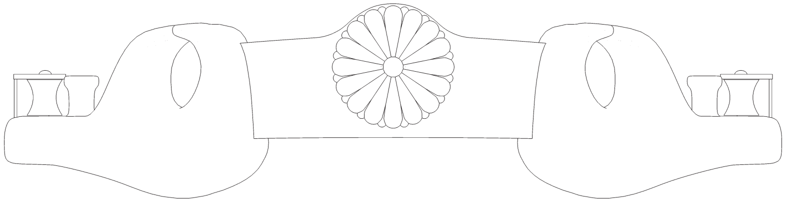
F2/43

BOW CHRYSANTHEMUM CREST AND FAIRLEADS (1/50 SCALE)

G1/1 PROFILE
G1/2 FRONT VIEW
G1/3 PLAN



G1/1



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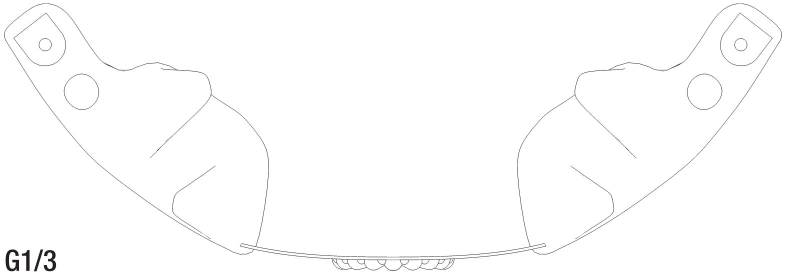
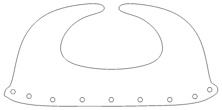


G1/3

SIDE FAIRLEAD (1/50 SCALE)

G1/4 PROFILE
G1/5 FRONT VIEW
G1/6 PLAN



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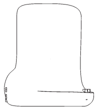

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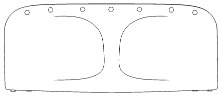
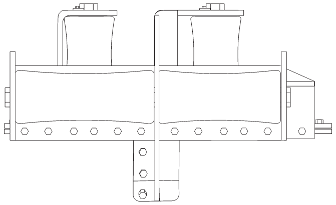


G1/6

PARAVANE FAIRLEAD (1/25 SCALE)

G1/7 PROFILE
G1/8 FRONT VIEW
G1/9 PLAN



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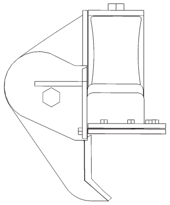

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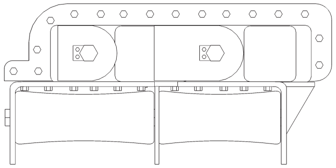
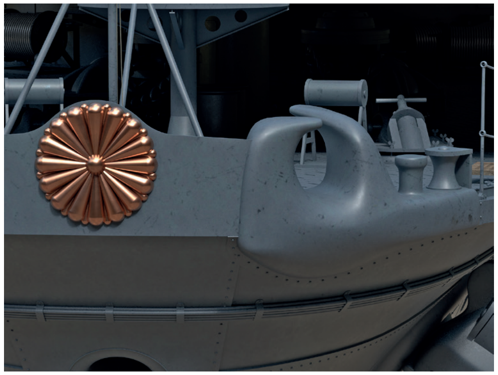
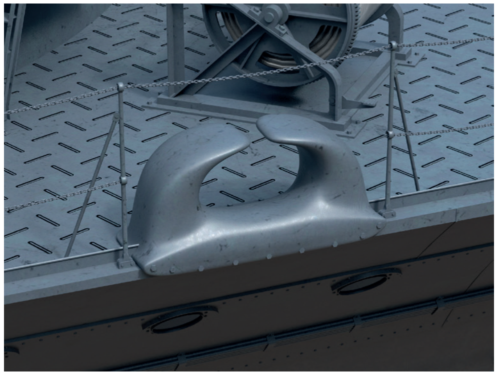
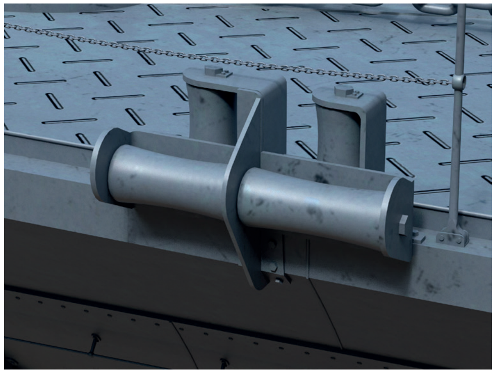


G1/9







DRAUGHT MARKS (1/50 SCALE)

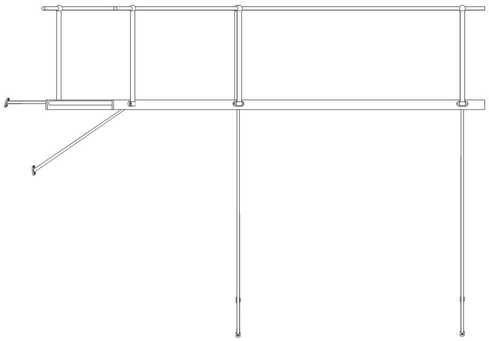
G1/10 PROFILE

TYPICAL SIDE CATWALK – FRAGMENT (1/50 SCALE)

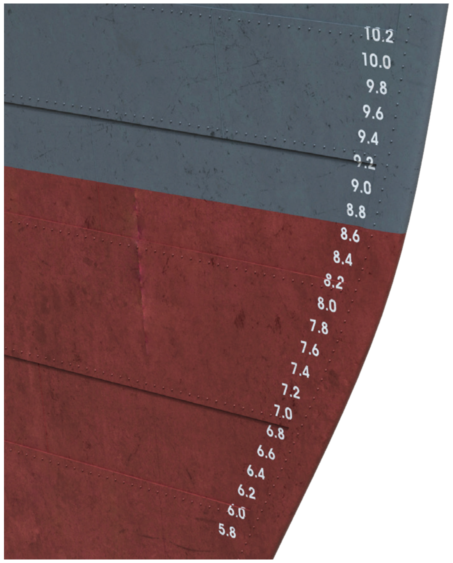
G1/11 PROFILE

G1/12 FRONT VIEW

G1/13 PLAN



G1/11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9.8
9.6
9.4
9.2
9.0
8.8
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8.4
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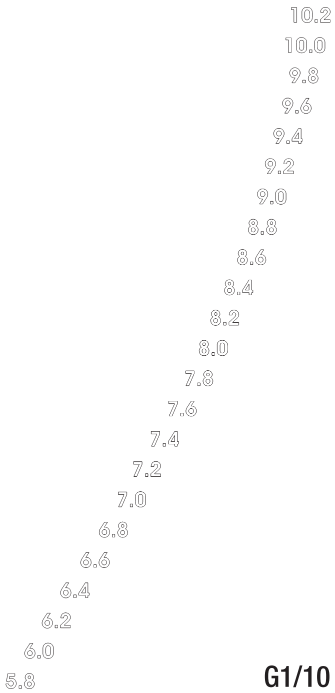
7.4
7.2
7.0
6.8
6.6
6.4
6.2
6.0
5.8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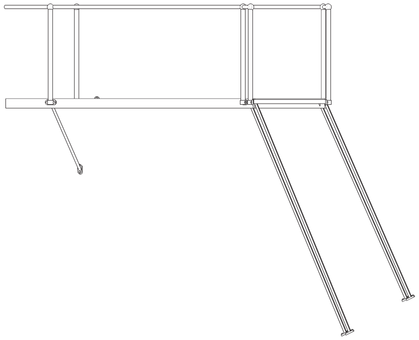
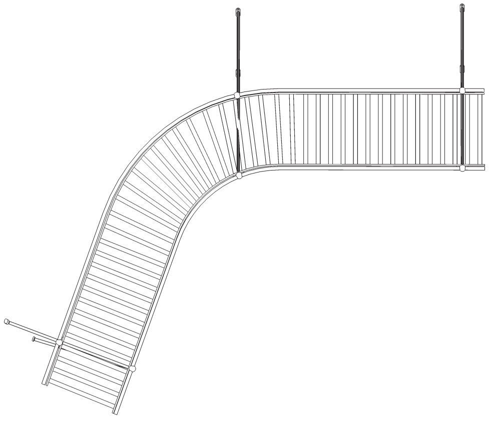
6.0
5.8

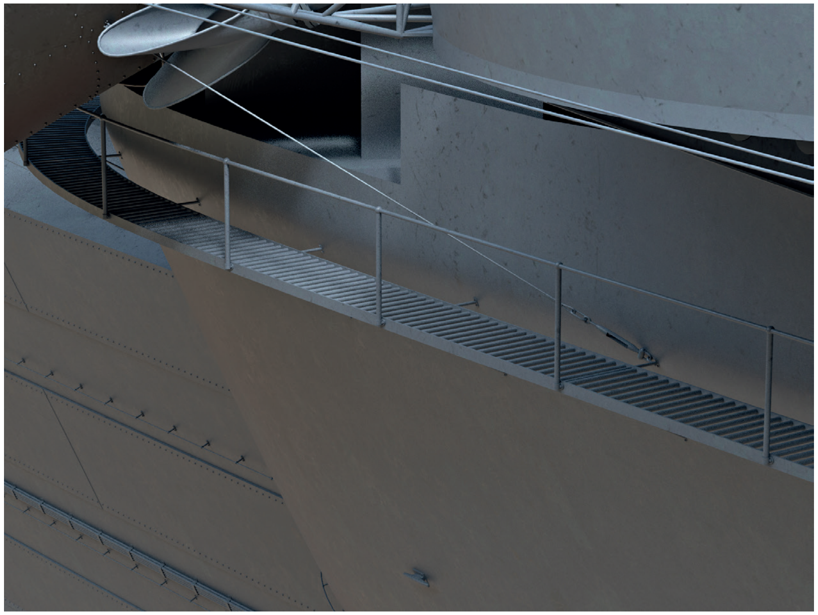
G1/10



G1/12



G1/13

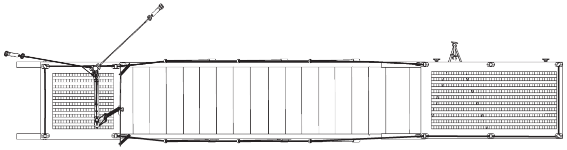


RIGGED ACCOMMODATION LADDER (1/100 SCALE)

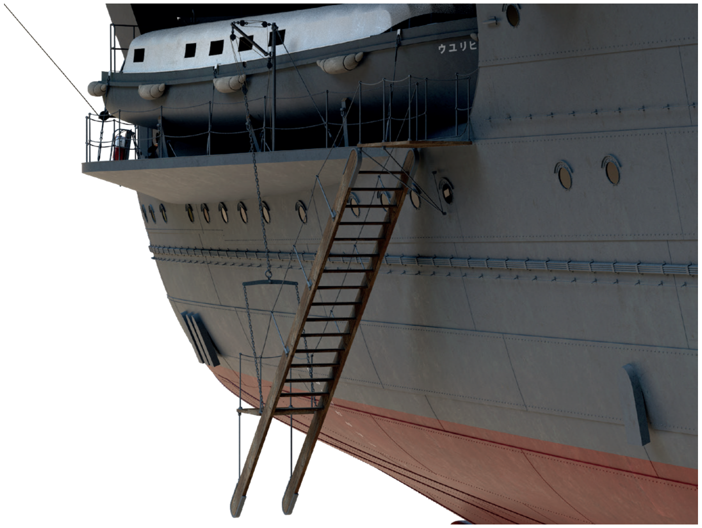
G1/14 PROFILE

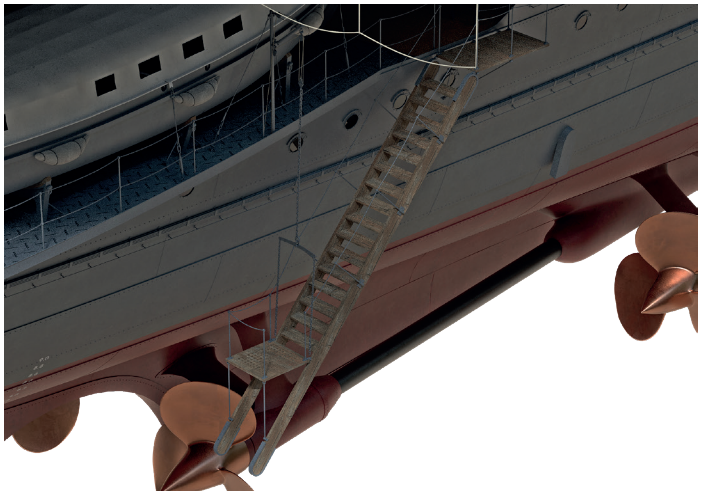
G1/15 FRONT VIEW

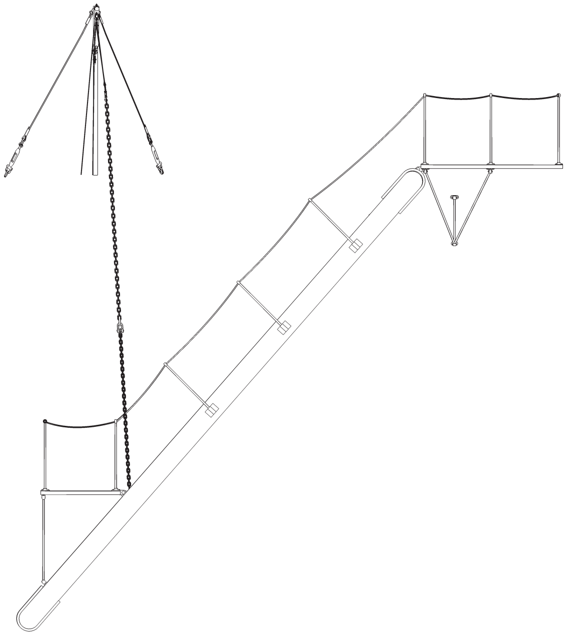
G1/16 PLAN



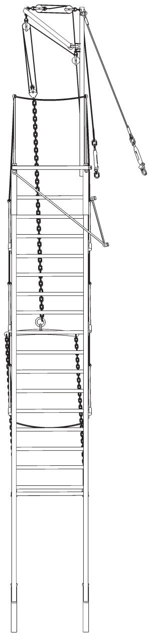
G1/16



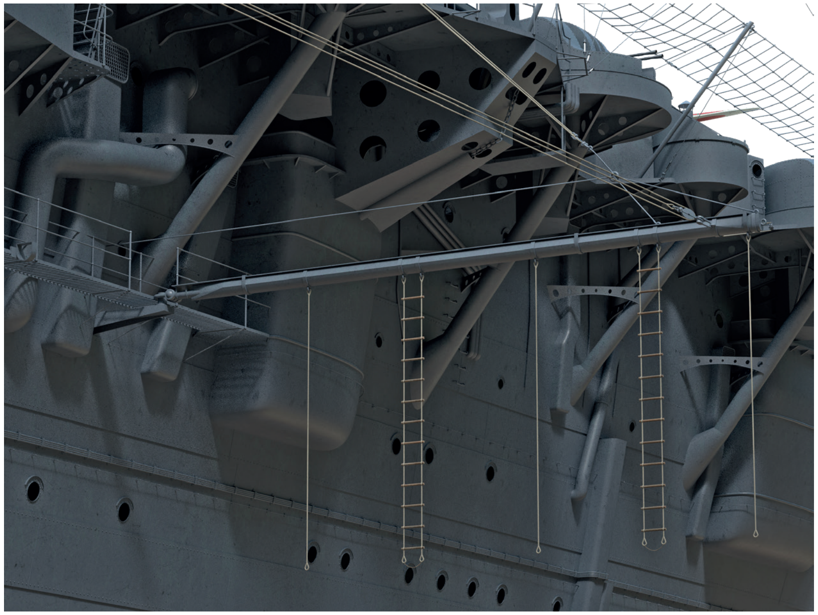




G1/14

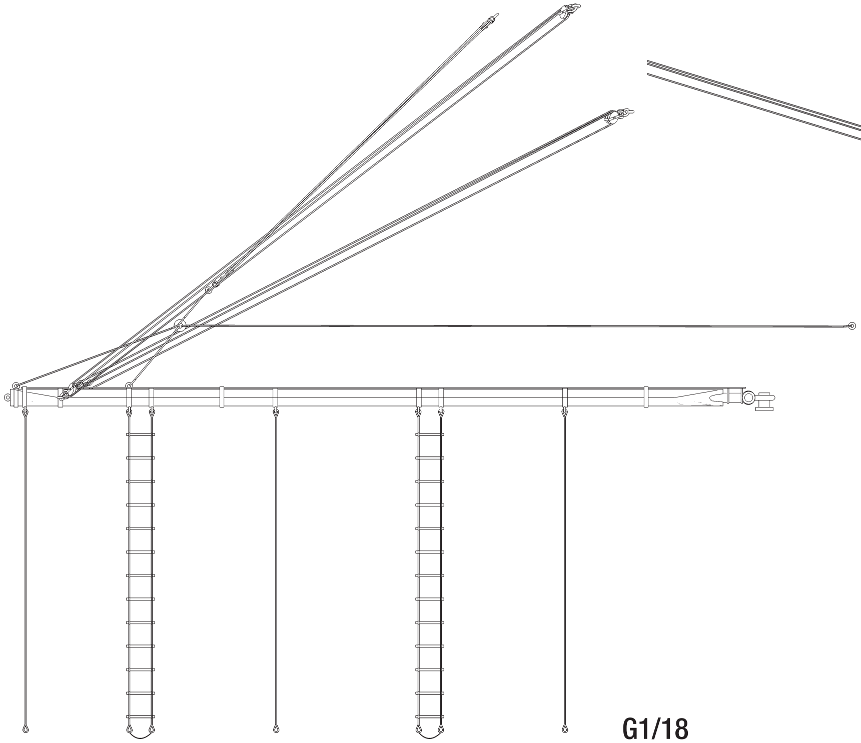


G1/15

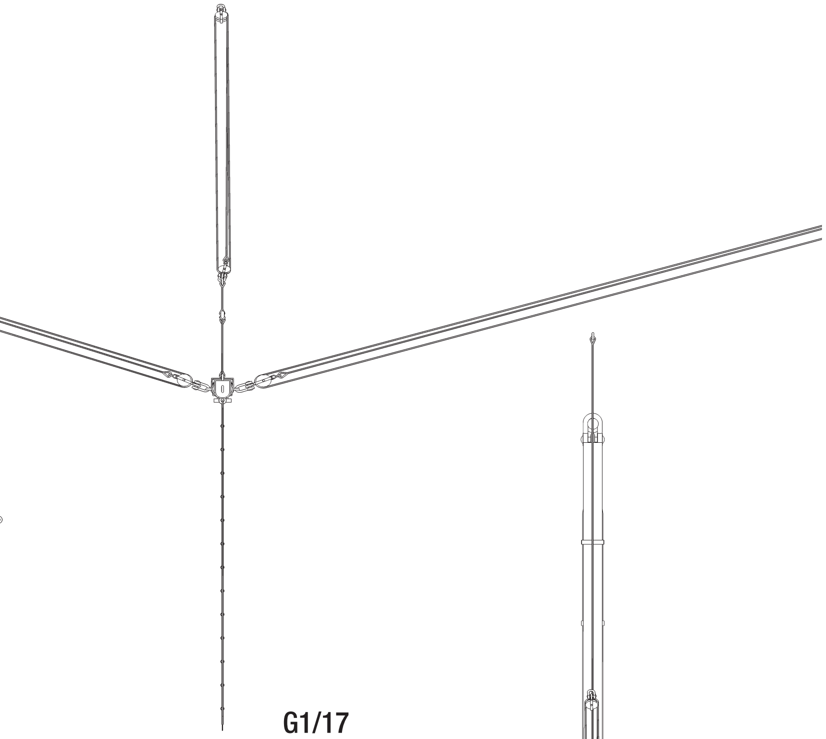


RIGGED BOAT BOOM (1/100 SCALE)

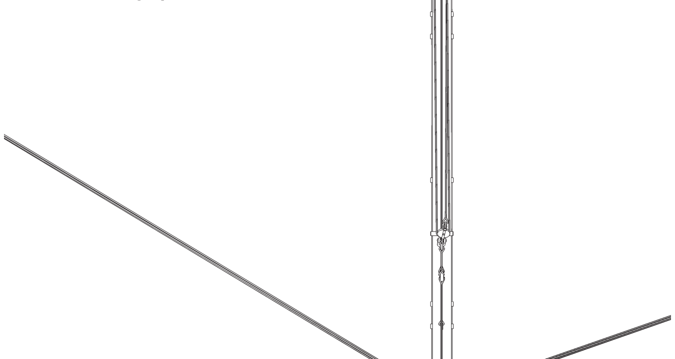
G1/17 PROFILE
G1/18 FRONT VIEW
G1/19 PLAN



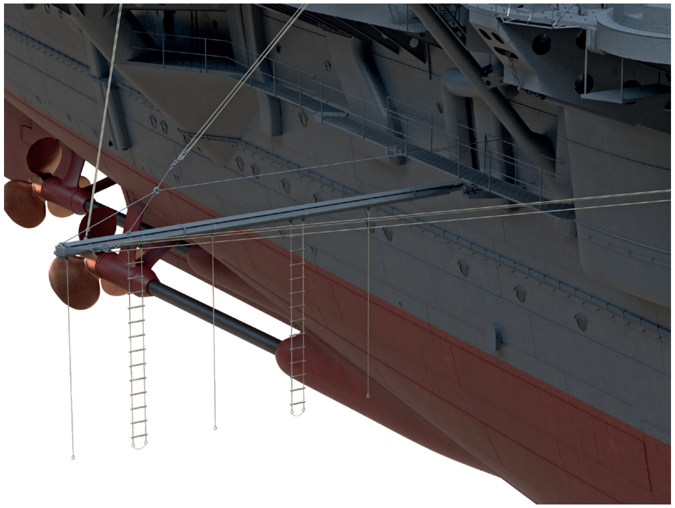
G1/18

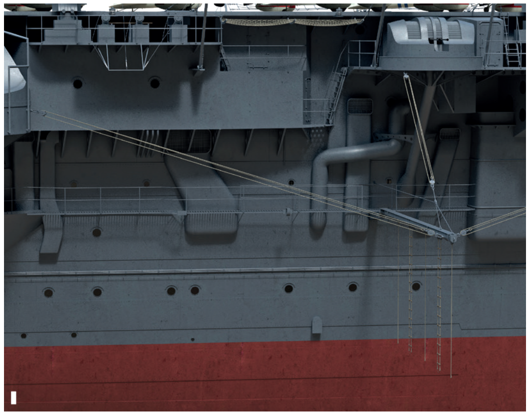


G1/17



G1/19

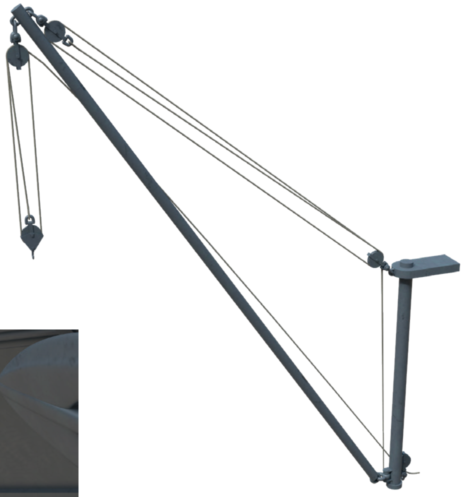




PARAVANE DERRICK (1/50 SCALE)

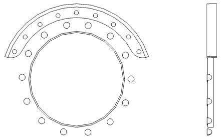
G1/20 PROFILE

G1/21 PLAN

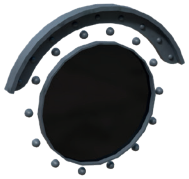


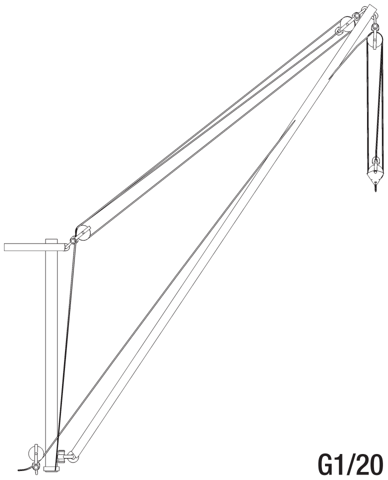
TYPICAL SIDE SCUTTLE (1/25 SCALE)

G1/22 PROFILE AND FRONT VIEW

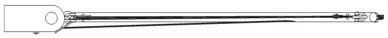


G1/22

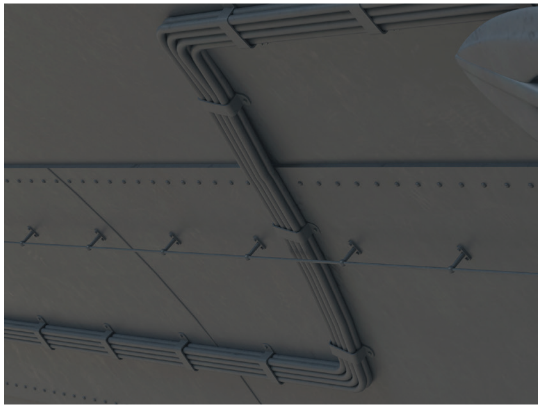




G1/20

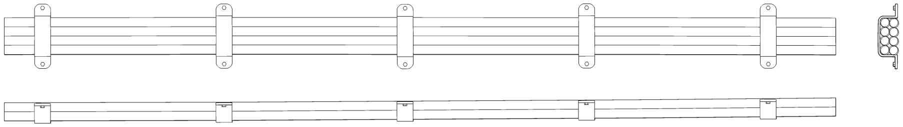


G1/21



DEGAUSSING CABLE – FRAGMENT (1/25 SCALE)

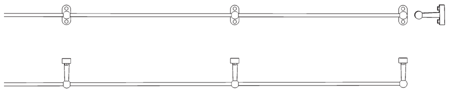
G1/23 PROFILE, FRONT VIEW AND PLAN



G1/23

HULL SIDE HANDRAIL – FRAGMENT (1/25 SCALE)

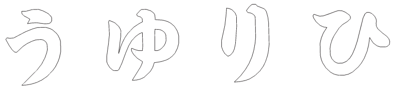
G1/24 PROFILE, FRONT VIEW AND PLAN



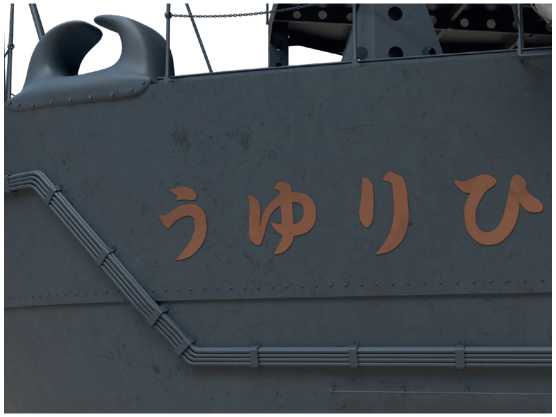
G1/24

SHIP'S NAME IN HIRAGANA ON BOTH SIDES OF THE STERN, MADE OF POLISHED BRASS AND PAINTED OVER AFTER THE START OF THE WAR (1/50 SCALE)

G1/25 PROFILE

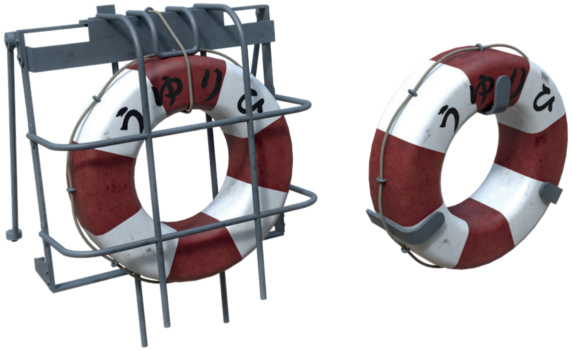


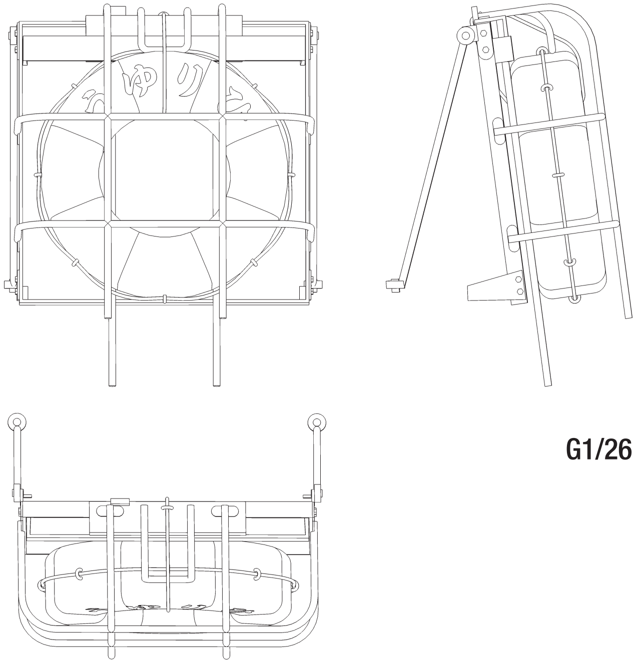
G1/25



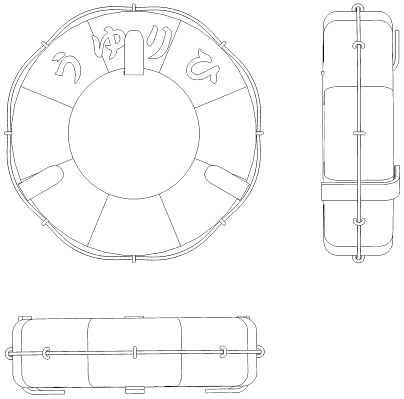
LIFE RING (1/25 SCALE)

G1/26 TYPE 1 – PROFILE, FRONT VIEW AND PLAN
G1/27 TYPE 2 – PROFILE, FRONT VIEW AND PLAN





G1/26



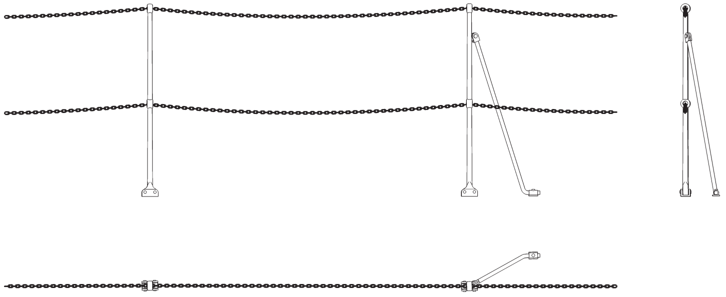
G1/27

TYPICAL AWNING STANCHION (1/50 SCALE)

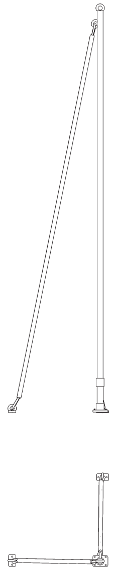
G1/28 PROFILE AND PLAN

TYPICAL FOLDING GUARD RAILS (1/40 SCALE)

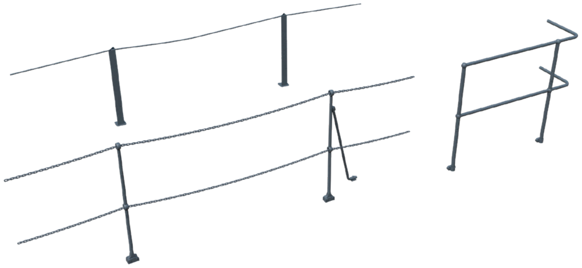
G1/29 PROFILE, FRONT VIEW AND PLAN



G1/29



G1/28



TYPICAL FIXED GUARD RAILS (1/40 SCALE)

G1/30 PROFILE, FRONT VIEW AND PLAN

REMOVABLE GUARD RAILS AROUND ELEVATORS (1/40 SCALE)

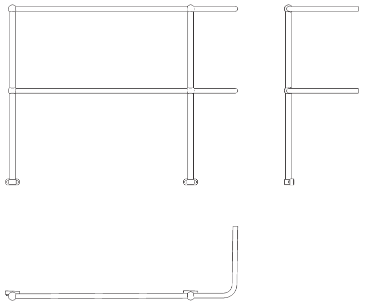
G1/31 PROFILE, FRONT VIEW AND PLAN

LEADMAN'S PLATFORM (1/50 SCALE)

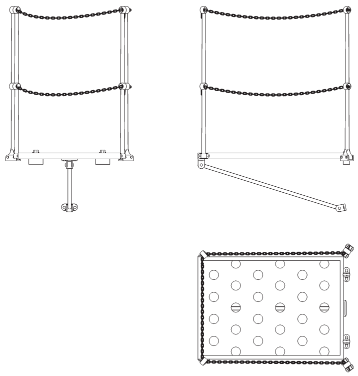
G1/32 FRONT VIEW AND PLAN

STERN PLATFORM (1/50 SCALE)

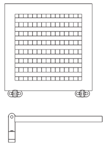
G1/33 PROFILE, FRONT VIEW AND PLAN



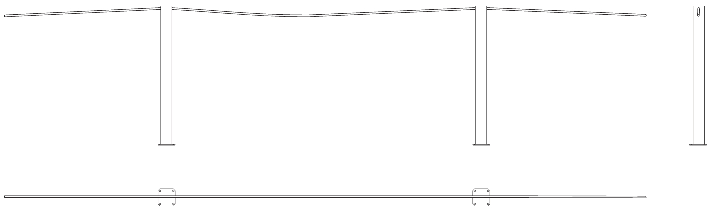
G1/30



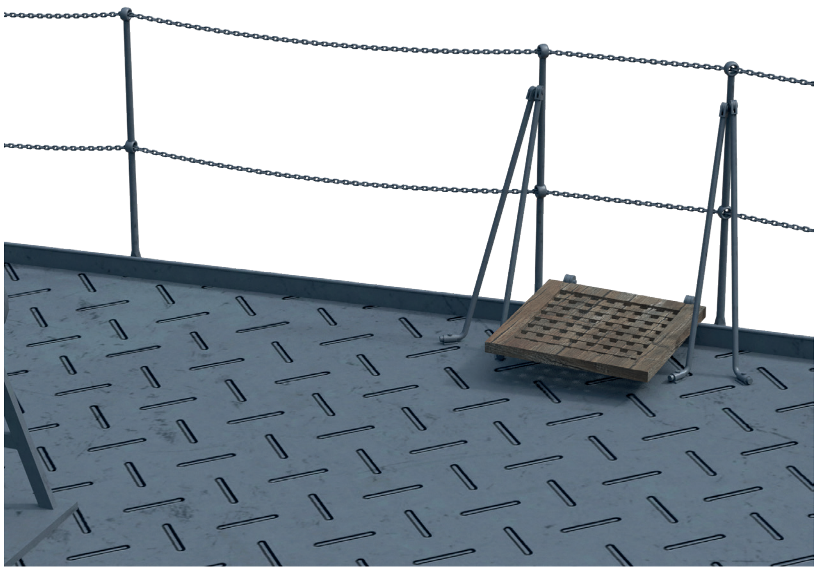
G1/33

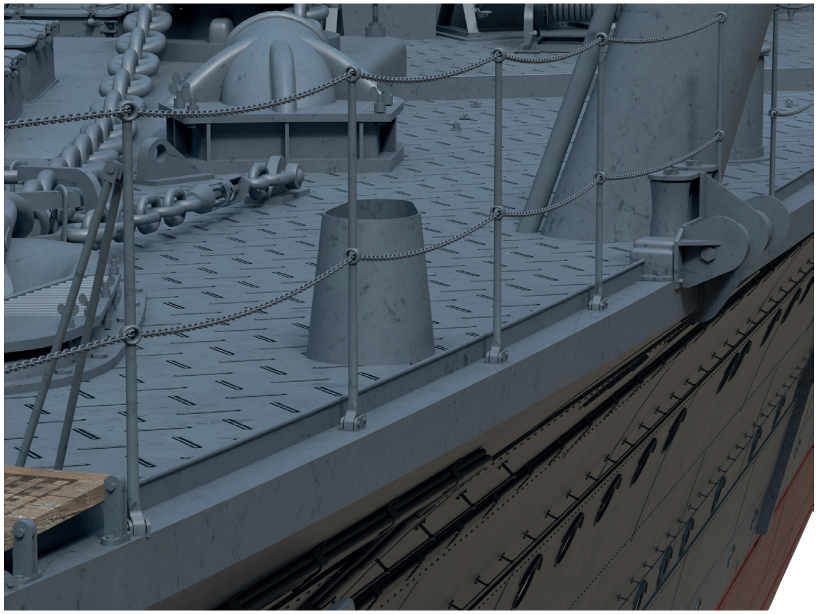


G1/32



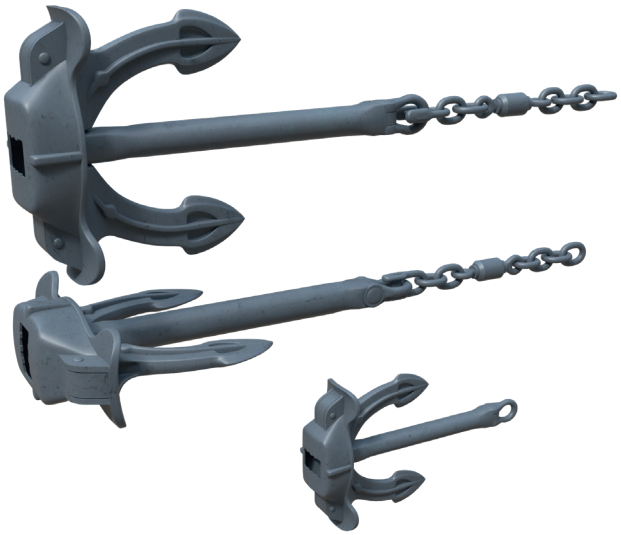
G1/31





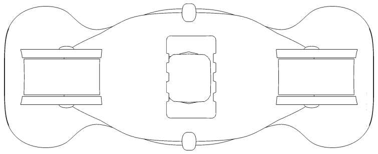
FORE 7.48 TON STOCKLESS ANCHOR WITH ITS CABLE (1/50 SCALE)

G1/34 PROFILE
G1/35 PLAN
G1/36 FRONT VIEW
G1/37 BACK VIEW

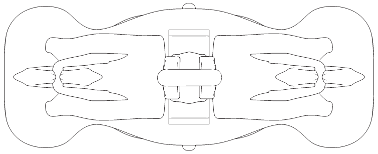


G1/34–37 FORE 7.48 TON STOCKLESS ANCHOR WITH ITS CABLE

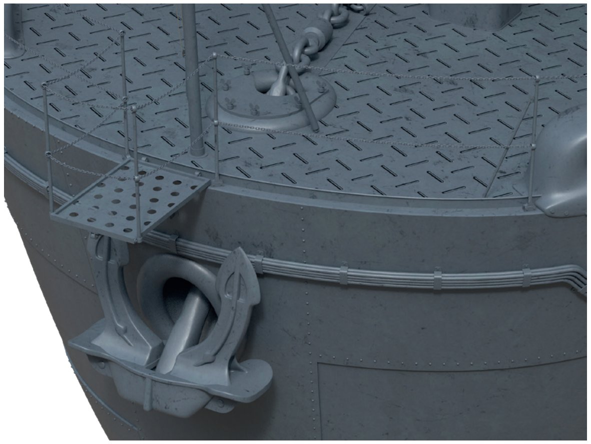
- **1** Anchor ring
- **2** Shank
- **3** Anchor head
- **4** Anchor link
- **5** Standard link
- **6** Swivel

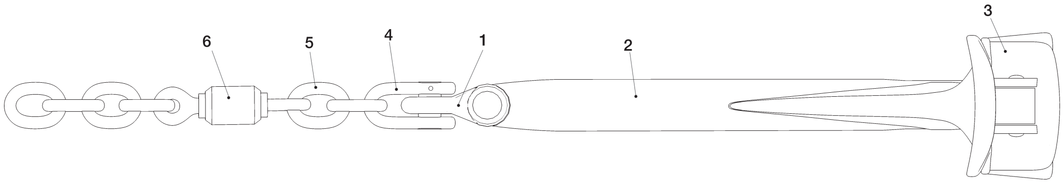


G1/36

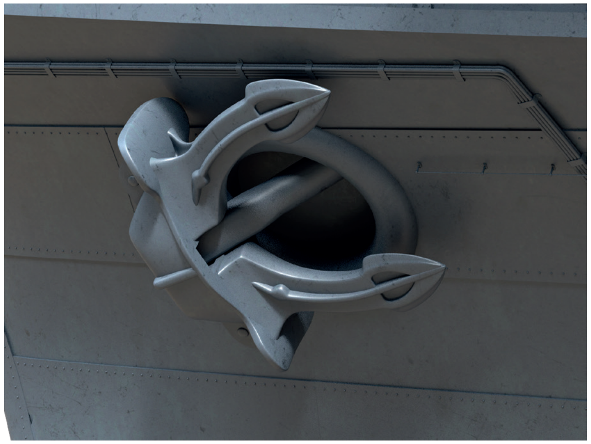


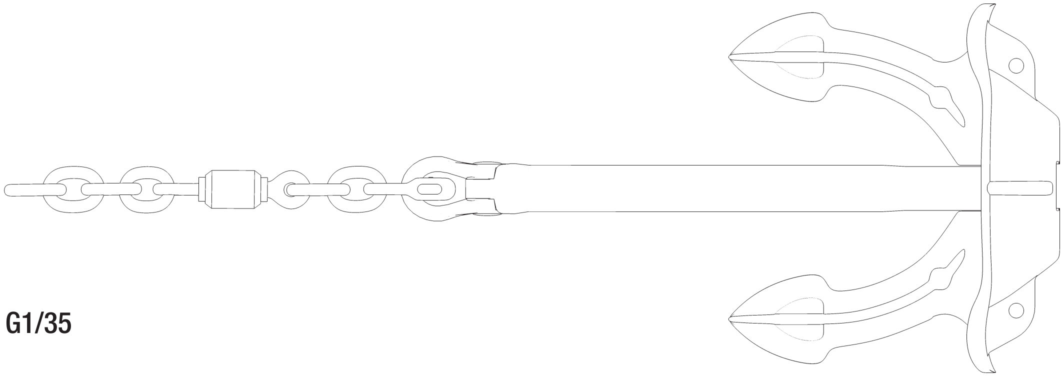
G1/37





G1/34

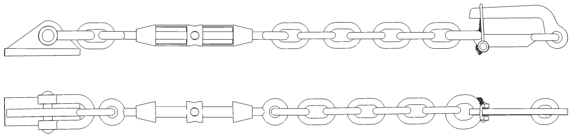




G1/35

ANCHOR CABLE STOPPER (1/50 SCALE)

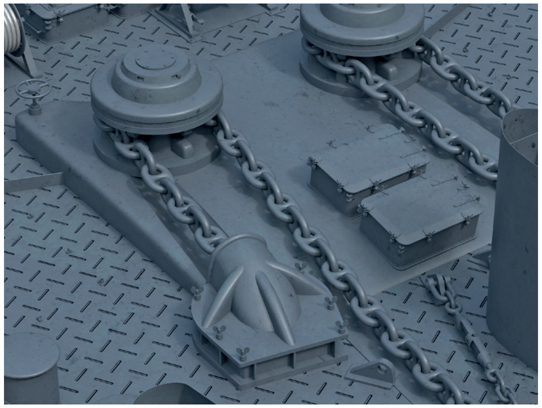
G1/38 PROFILE AND PLAN

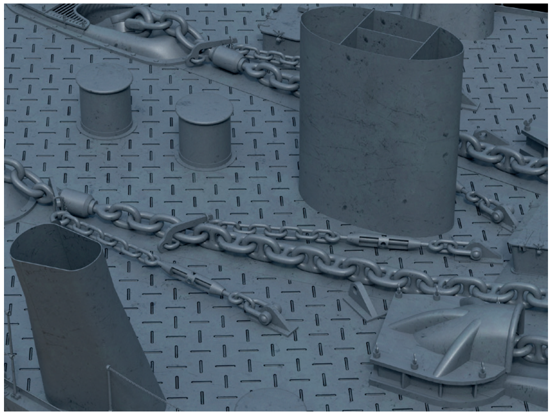


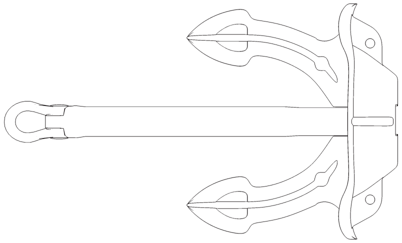
G1/38

STERN 2.65 TON STOCKLESS ANCHOR (1/50 SCALE)

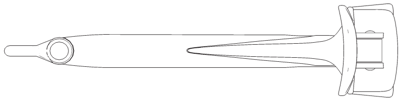
G1/39 PROFILE
G1/40 PLAN







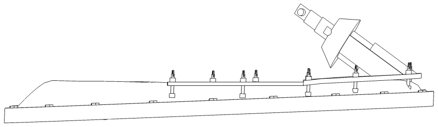
G1/39



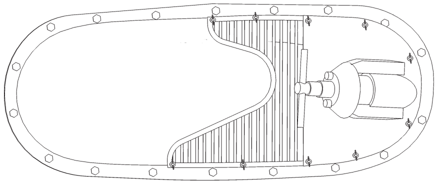
G1/40

ANCHOR HAWSE (1/50 SCALE)

G1/41 PROFILE
G1/42 PLAN



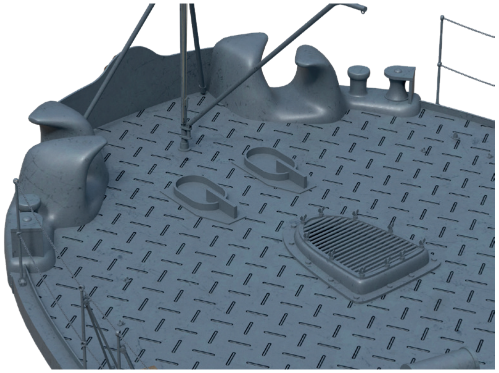
G1/41

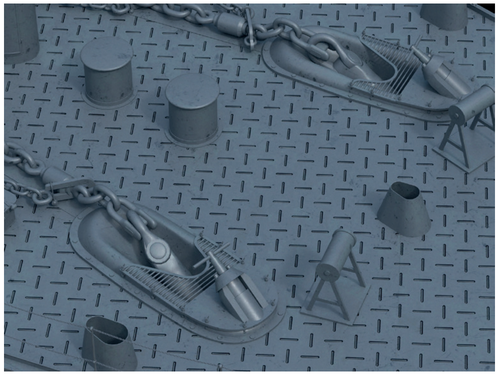


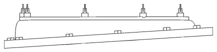
G1/42

MOORING HAWSE (1/50 SCALE)

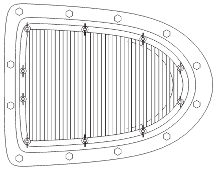
G1/43 PROFILE
G1/44 PLAN







G1/43



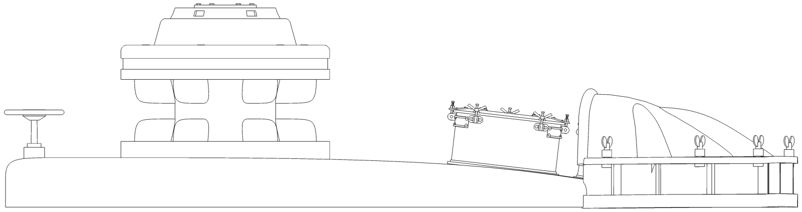
G1/44

FORE CAPSTANS (1/50 SCALE)

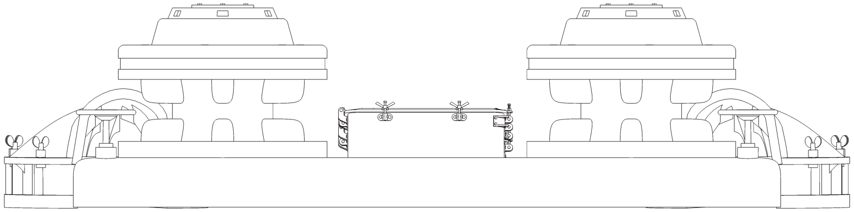
G1/45 PROFILE
G1/46 BACK VIEW
G1/47 PLAN (FRAGMENT)

STERN CAPSTAN (1/50 SCALE)

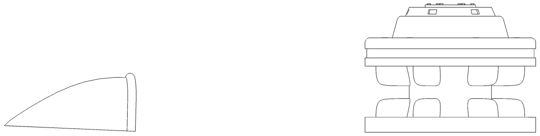
G1/48 PROFILE
G1/49 PLAN



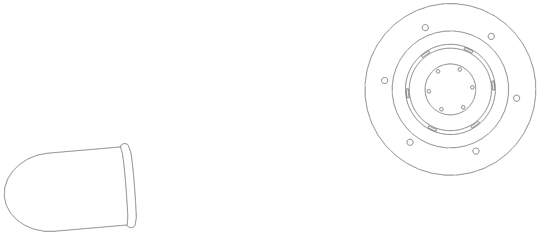
G1/45



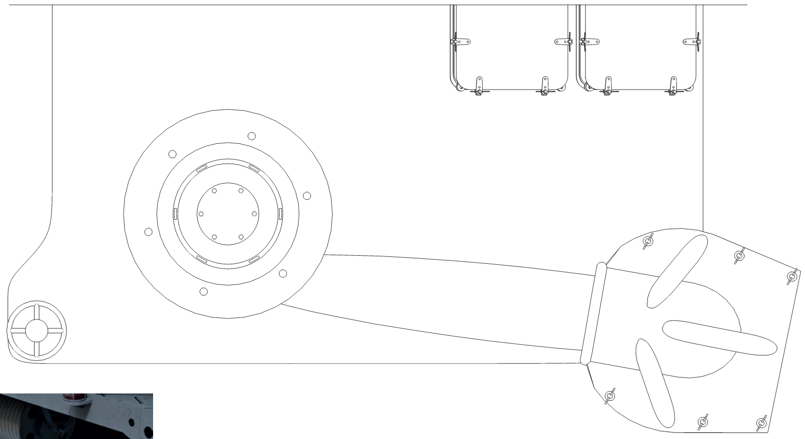
G1/46



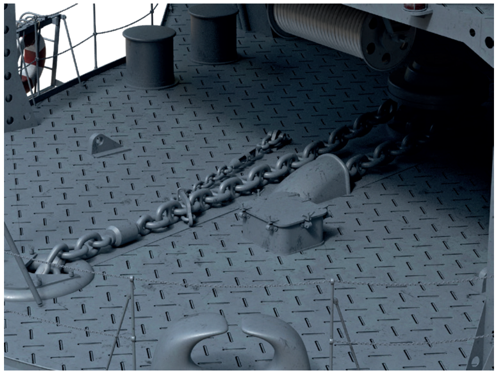
G1/48



G1/49



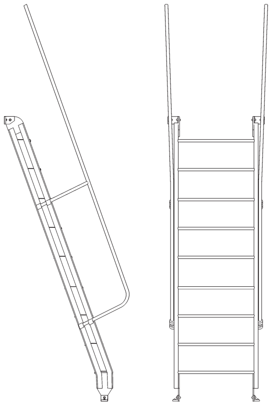
G1/47



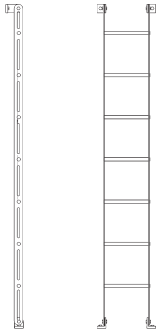
TYPICAL LADDERS (1/50 SCALE)

G1/50 LADDER TYPE 1

G1/51 LADDER TYPE 2



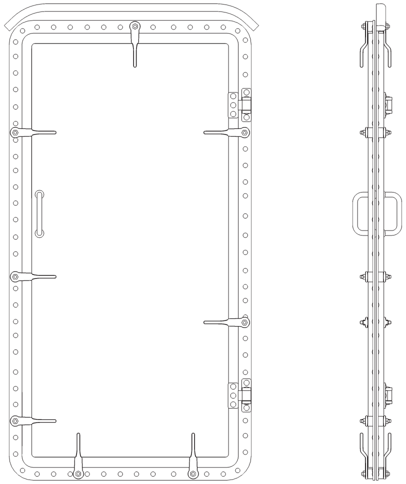
G1/50



G1/51

TYPICAL WATERTIGHT DOOR (1/25 SCALE)

G1/52 PROFILE AND BACK VIEW

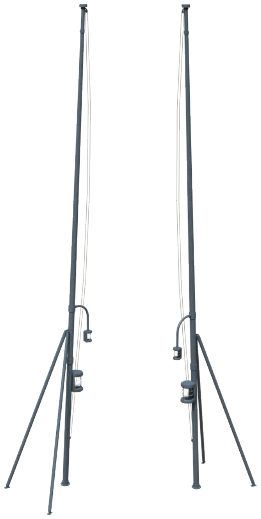


JACK STAFF (1/100 SCALE)

G1/53 PROFILE

G1/54 FRONT VIEW

G1/55 PLAN

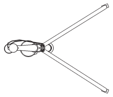


ENSIGN STAFF (1/100 SCALE)

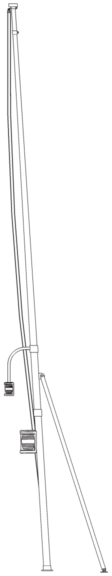
G1/56 PROFILE

G1/57 BACK VIEW

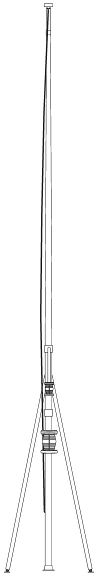
G1/58 PLAN



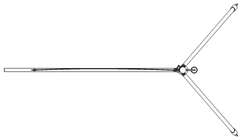
G1/58



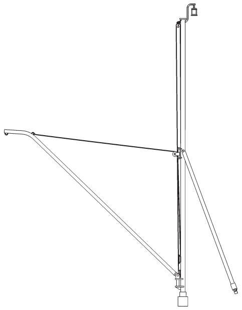
G1/56



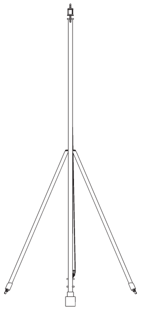
G1/57



G1/55



G1/53



G1/54

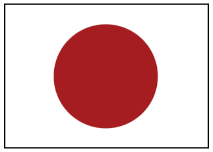
FLAGS (1/50 SCALE)

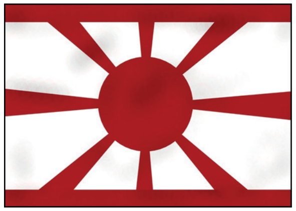
G1/59 IMPERIAL JAPANESE NAVY ENSIGN FLOWN FROM ENSIGN STAFF

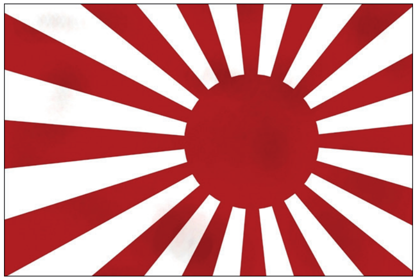
G1/60 IMPERIAL JAPANESE NAVY BATTLE ENSIGN FLOWN FROM MAINMAST

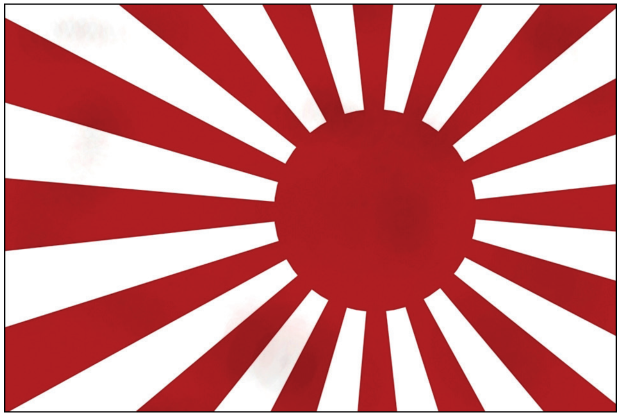
G1/61 REAR ADMIRAL'S FLAG

G1/62 JACK


G1/62


G1/61


G1/60


G1/59

STERN SPEED SIGNAL LIGHT ARRAY (1/50 SCALE)

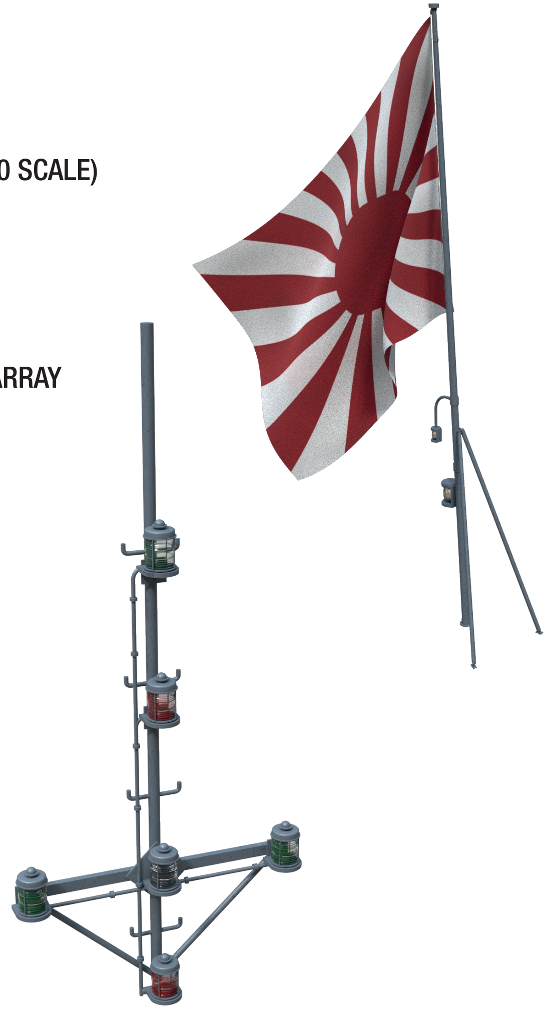
G1/63 PROFILE

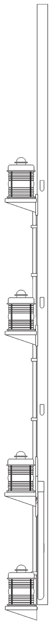
G1/64 BACK VIEW

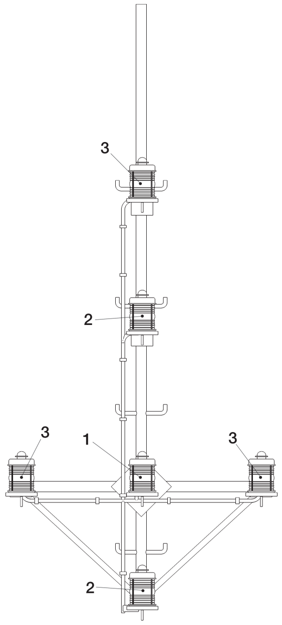
G1/65 PLAN

G1/63–65 STERN SPEED SIGNAL LIGHT ARRAY

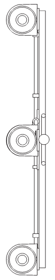
- **1** White light
- **2** Red light
- **3** Green light




G1/63

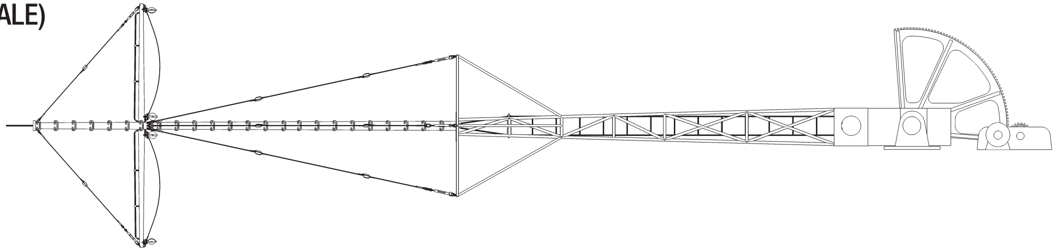


G1/64

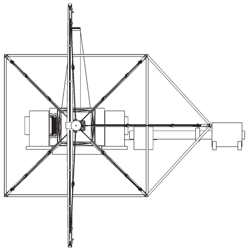

G1/65

WIRE ANTENNA MAST – LOWERED POSITION (1/100 SCALE)

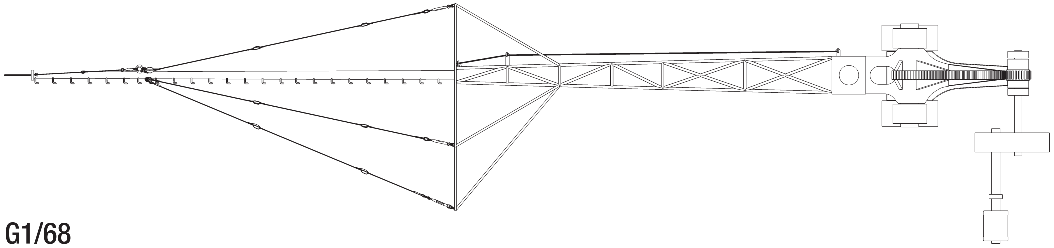
G1/66 PROFILE
G1/67 FRONT VIEW
G1/68 PLAN



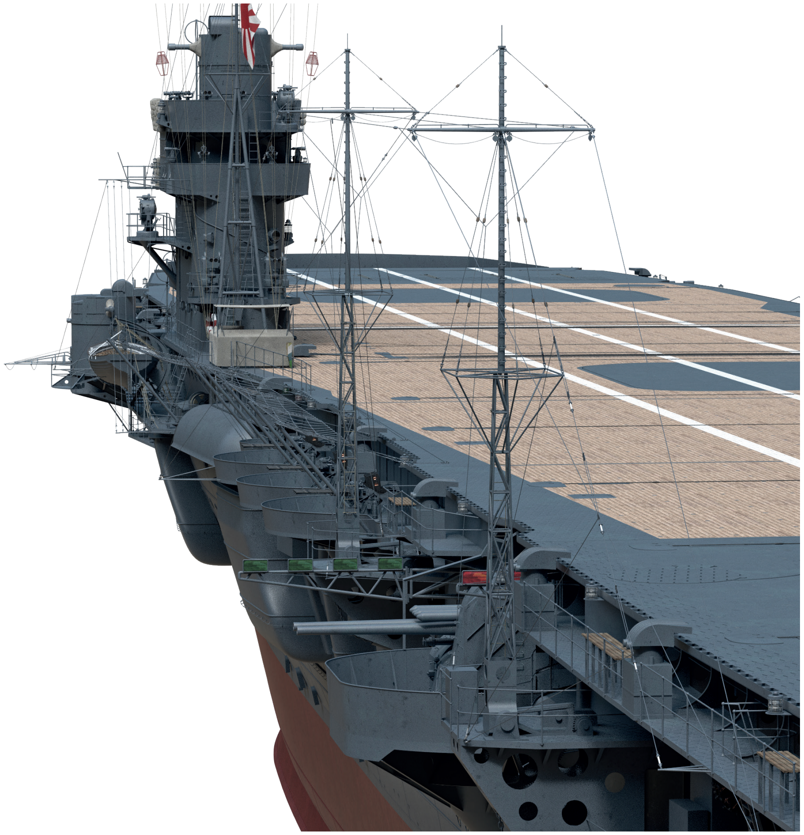
G1/67

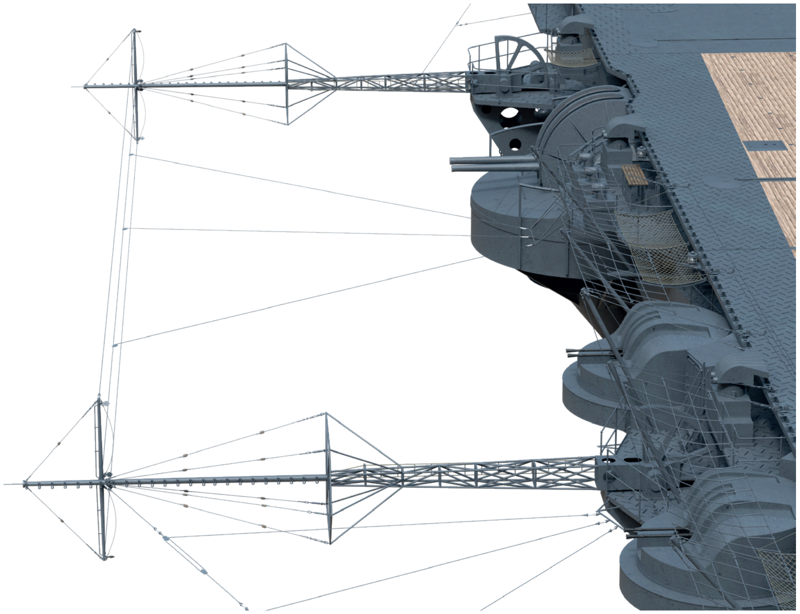


G1/66



G1/68





WIND STRENGTH TRANSMITTER (1/25 SCALE)
G1/69 PROFILE AND PLAN

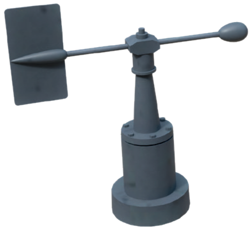
WIND DIRECTION INDICATOR (1/25 SCALE)
G1/70 PROFILE AND PLAN

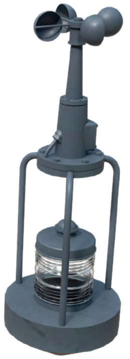
WIRE ANTENNA INSULATOR (1/25 SCALE)
G1/71 PROFILE

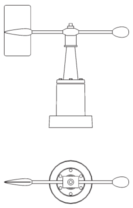
TYPE 90 WIRELESS TELEPHONE TRANSMITTER ANTENNA (1/40 SCALE)
G1/72 PROFILE AND PLAN

DIRECTION FINDER LOOP ANTENNA (1/40 SCALE)
G1/73 PROFILE AND PLAN

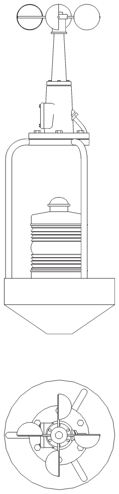
SPEED SIGNALLING MARK (1/25 SCALE)
G1/74 PROFILE AND PLAN



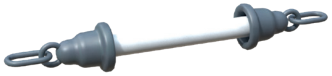




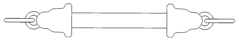
G1/70

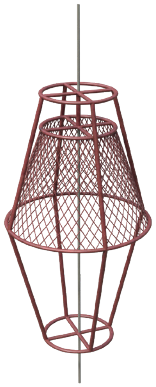


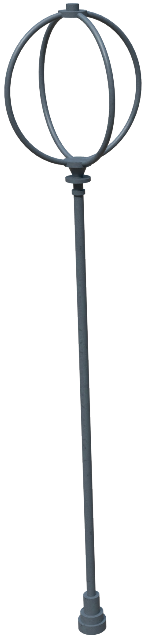
G1/69

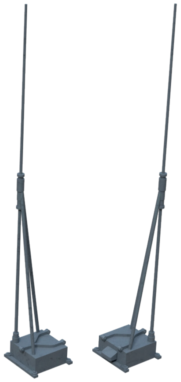


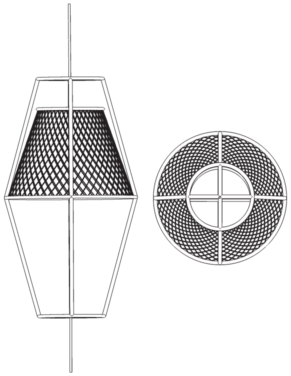
G1/71



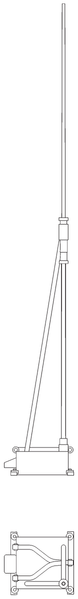




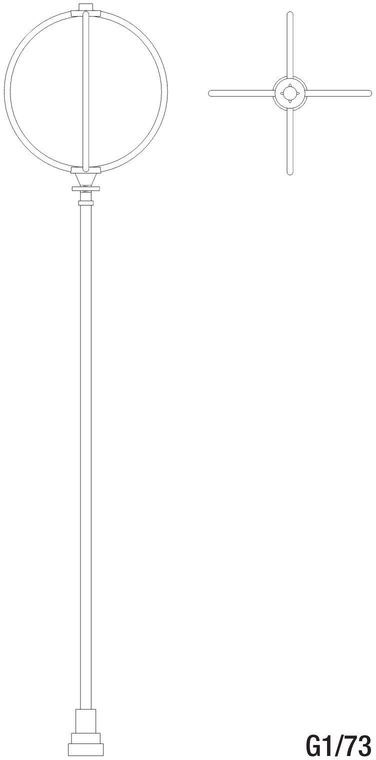




G1/74



G1/72



G1/73

RUDDER SIGNALLING MARKS – STARBOARD SIDE GREEN, PORT SIDE RED (1/50 SCALE)

G1/75 PROFILE AND PLAN

30CM DECK LAMP (1/25 SCALE)

G1/76 PROFILE, BACK VIEW AND PLAN

POSITION LIGHT – STARBOARD SIDE GREEN, PORT SIDE RED (1/25 SCALE)

G1/77 PROFILE, FRONT VIEW AND PLAN

2KW SIGNAL LAMP (1/25 SCALE)

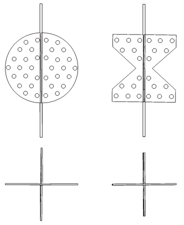
G1/78 PROFILE, FRONT VIEW AND PLAN

TYPICAL LANTERN (1/25 SCALE)

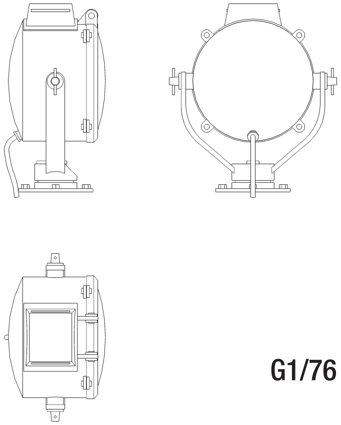
G1/79 PROFILE AND PLAN

STEAM PIPE (1/50 SCALE)

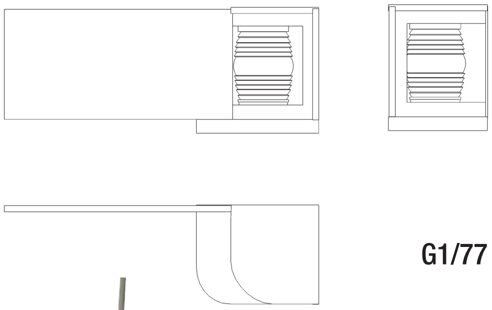
G1/80 PROFILE, FRONT VIEW AND PLAN



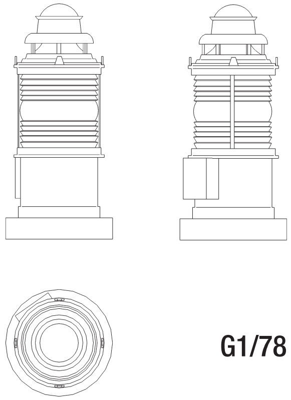
G1/75



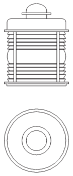
G1/76



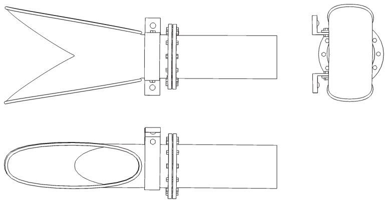
G1/77



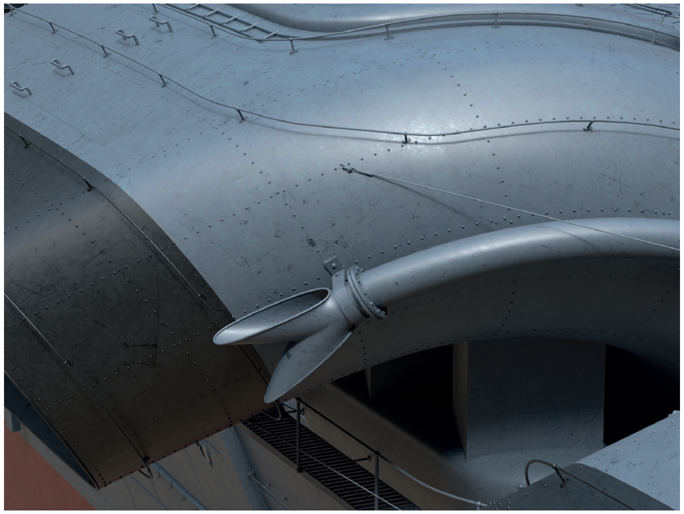
G1/78

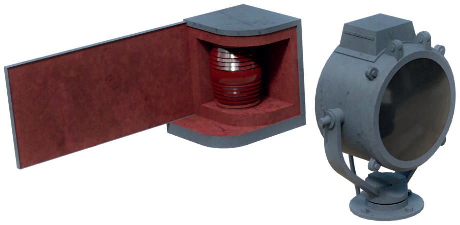


G1/79



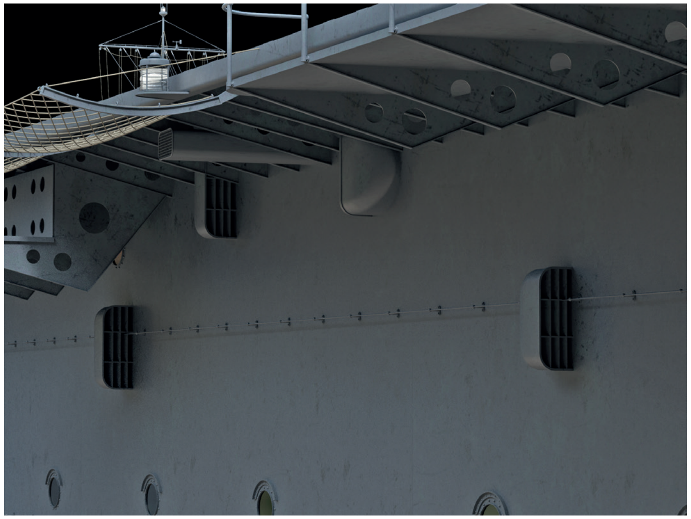
G1/80

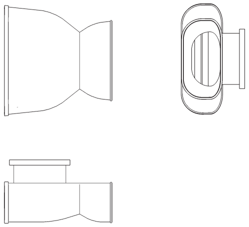




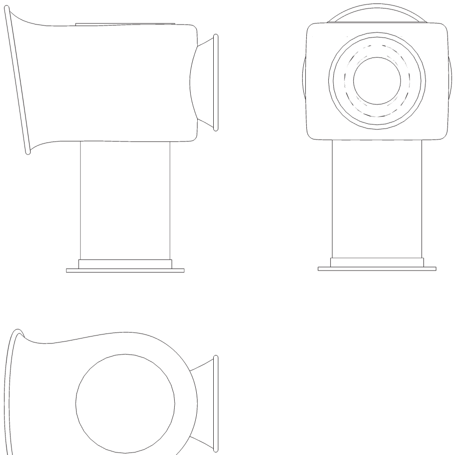
TYPICAL VENTS (1/25 SCALE)

G1/81 DECK TYPE
G1/82 WALL TYPE 1
G1/83 WALL TYPE 2
G1/84 WALL TYPE 3

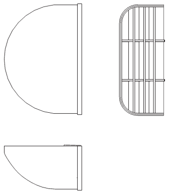




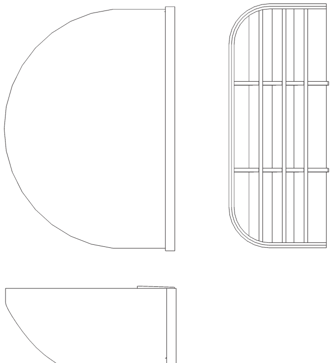
G1/82



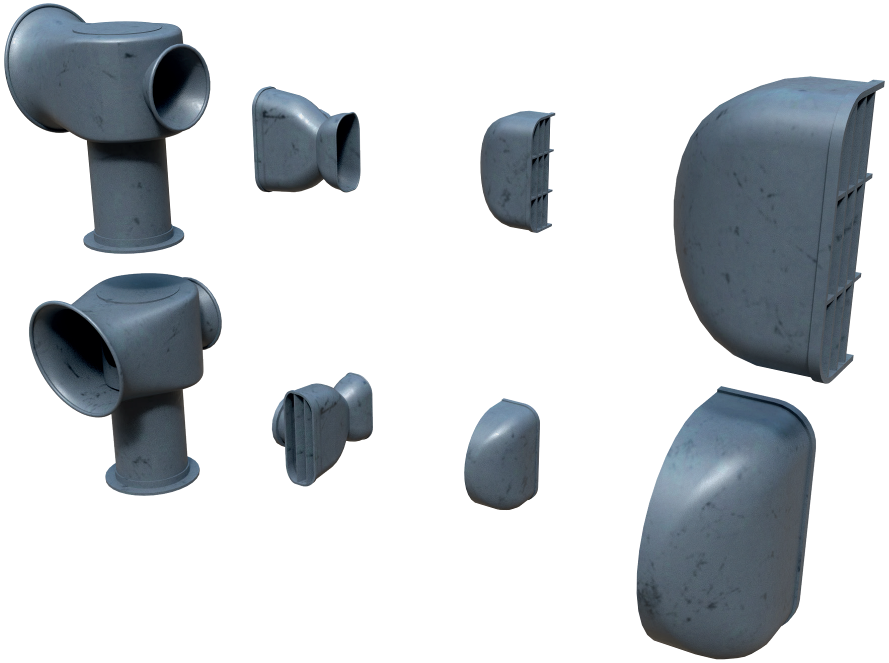
G1/81



G1/83

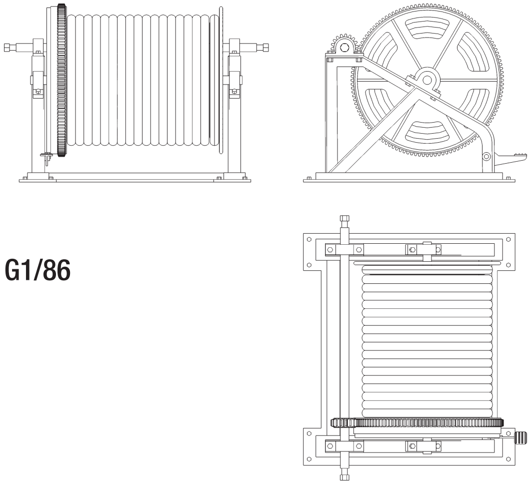


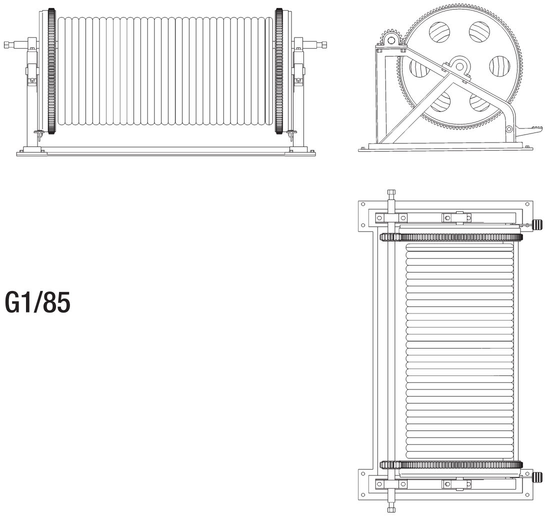
G1/84

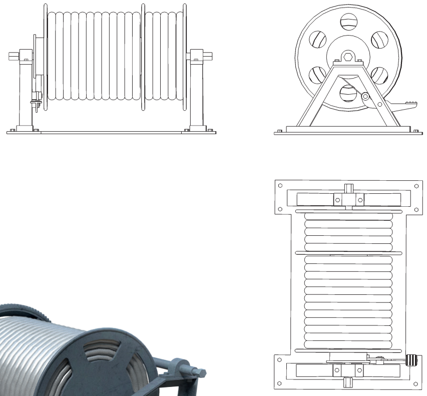


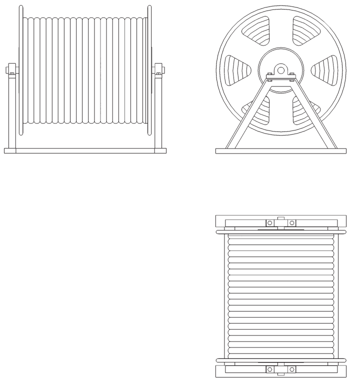
TYPICAL REELS (1/50 SCALE)

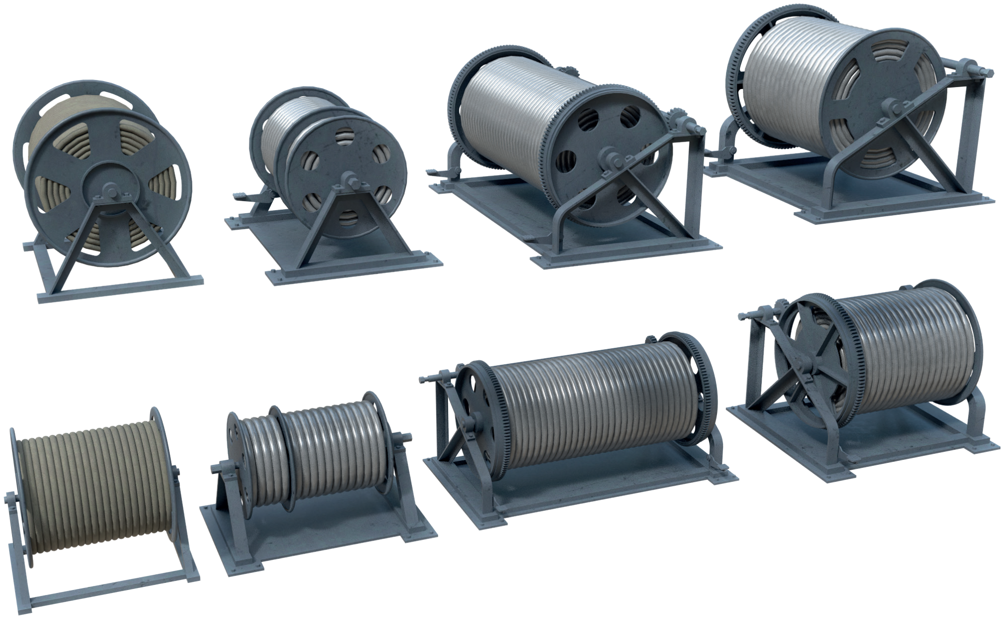
G1/85 TYPE 1
G1/86 TYPE 2
G1/87 TYPE 3
G1/88 TYPE 4


G1/86


G1/85


G1/87


G1/88

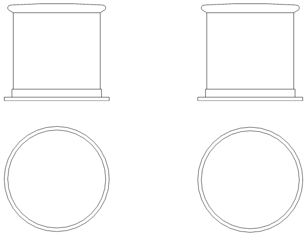


DECK HATCHES (1/50 SCALE)

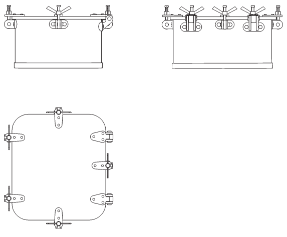
G1/89 LARGE TYPE
G1/90 SMALL TYPE

BOLLARDS (1/50 SCALE)

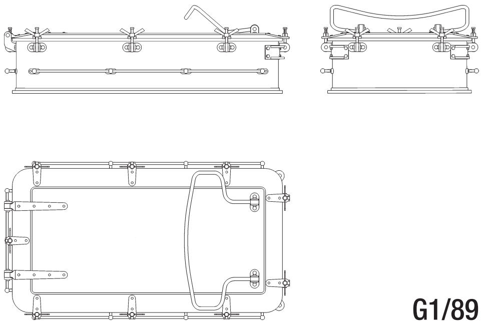
G1/91 PROFILE AND PLAN



G1/91



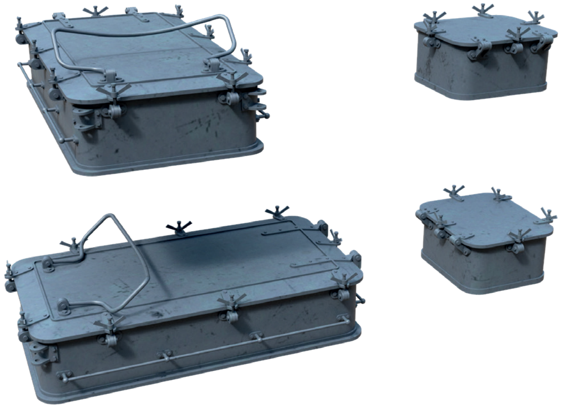
G1/90

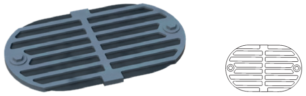


G1/89

SCUPPER (1/25 SCALE)

G1/92 PLAN

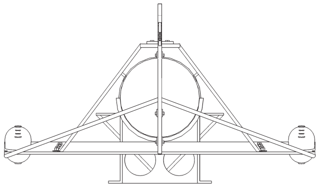




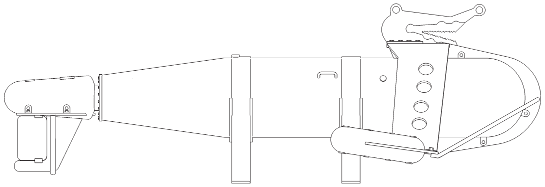
G1/92

PARAVANE (1/50 SCALE)

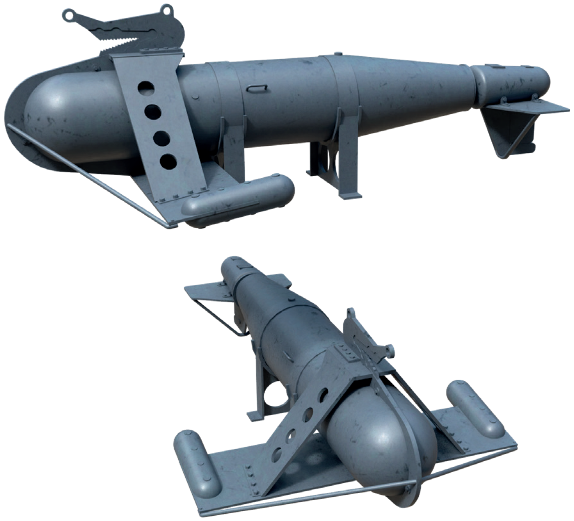
G1/93 PROFILE
G1/94 FRONT VIEW
G1/94 BACK VIEW
G1/96 PLAN

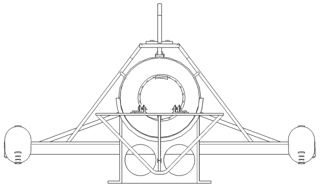


G1/94

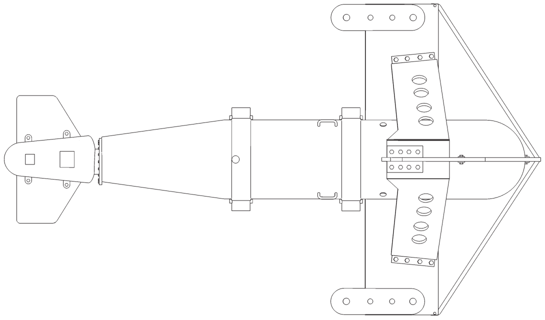


G1/93





G1/95



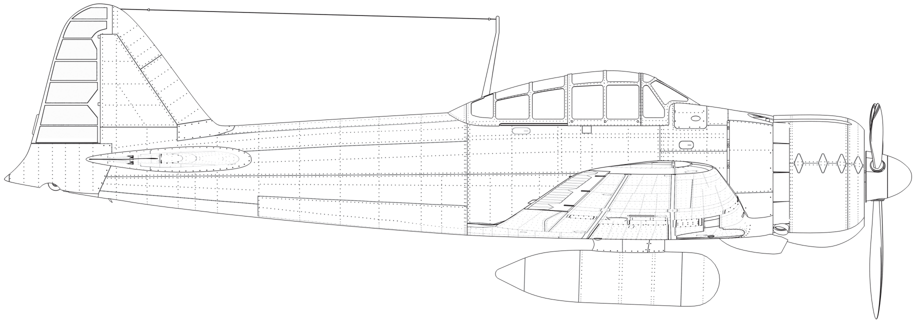
G1/96

MITSUBISHI TYPE 0 CARRIER FIGHTER MODEL 21 (1/75 SCALE)
三菱零式艦上戦闘機二一型 – MITSUBISHI REI SHIKI KANJŌ SENTŌKI NIICHI GATA

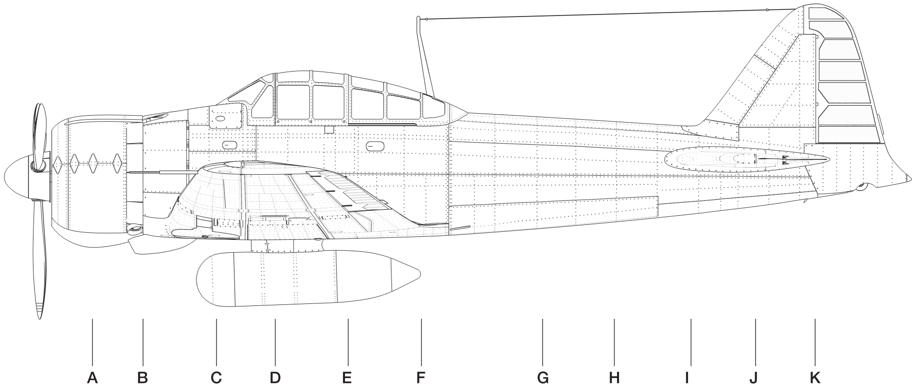
ALSO KNOWN AS: MITSUBISHI A6M2B, REI-SEN (零戦) OR ZERO-SEN

ALLIED CODENAME: *ZEKE OR ZERO*

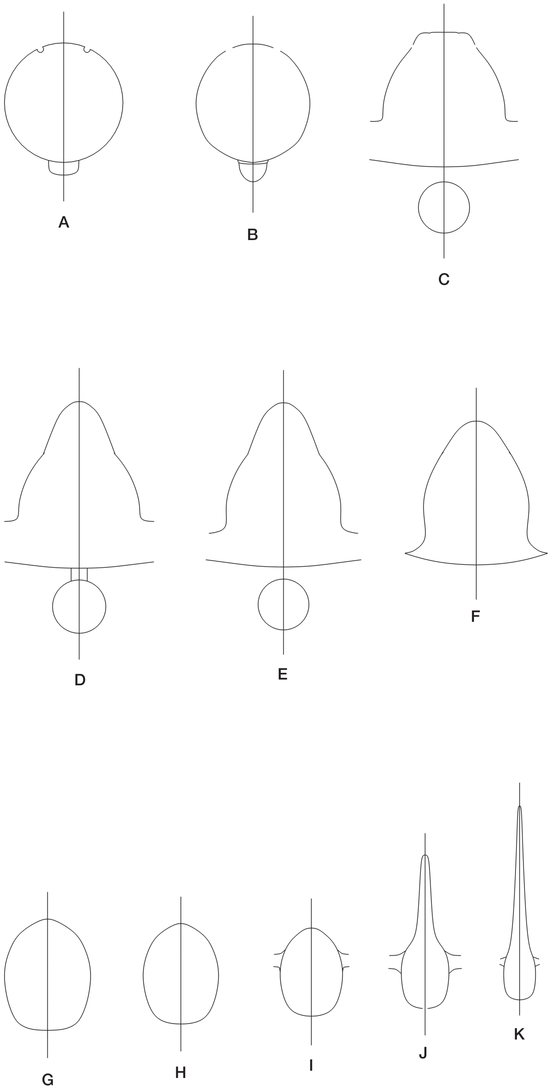
H1/1 RIGHT PROFILE
H1/2 LEFT PROFILE
H1/3 FUSELAGE SECTIONS



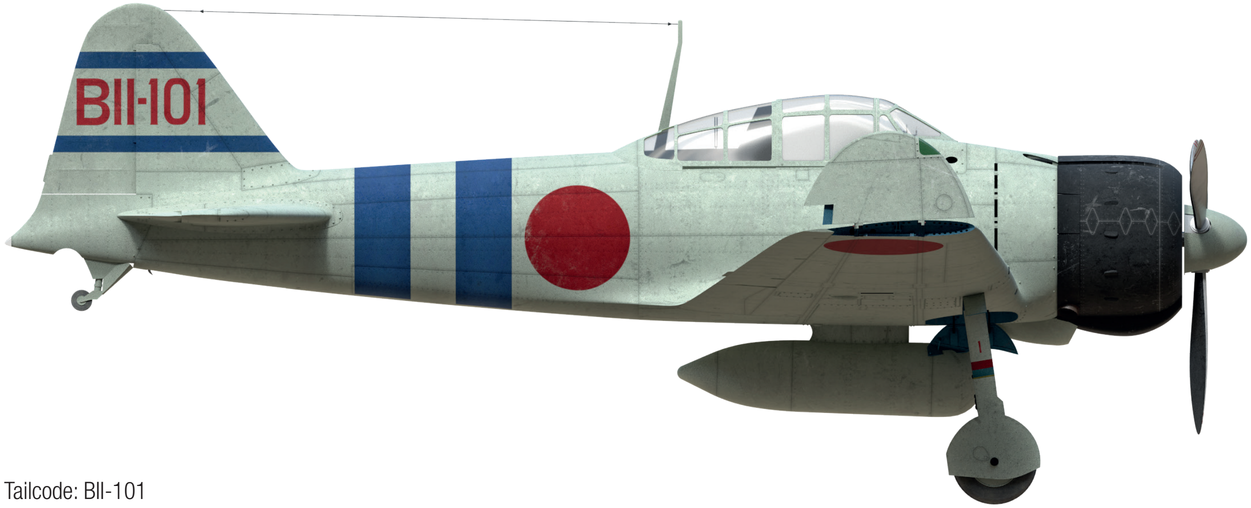
H1/1



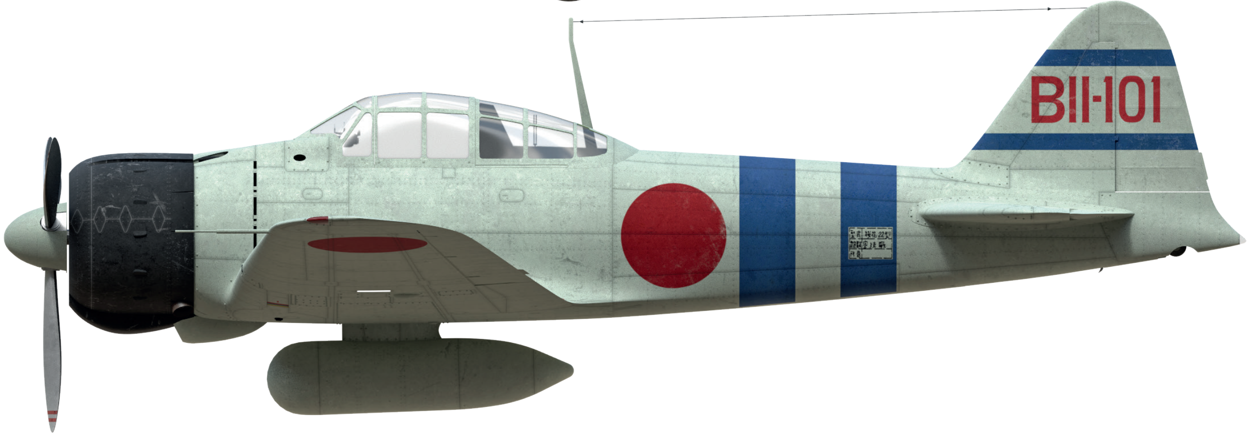
H1/2

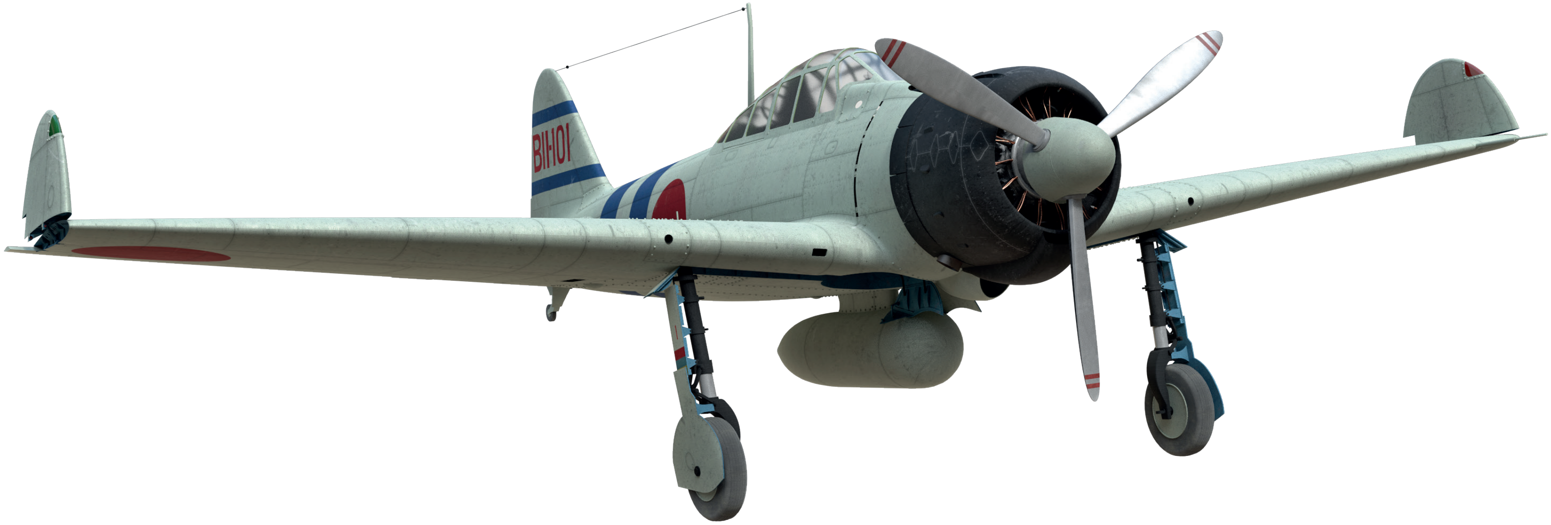


H1/3



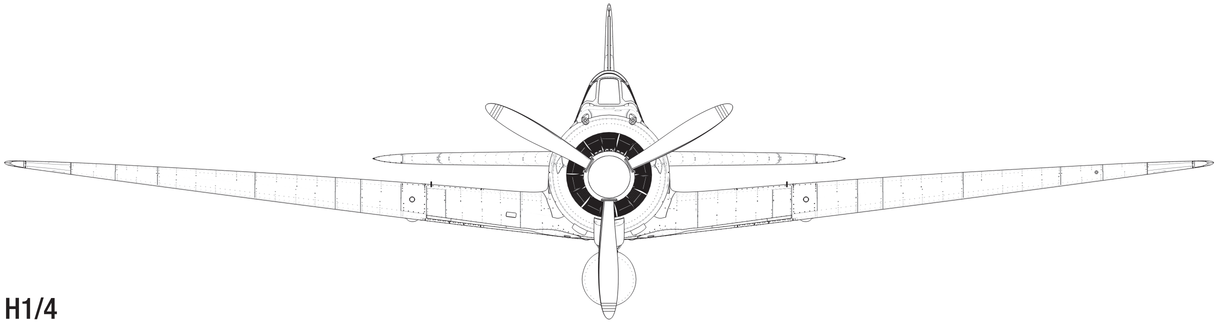
Tailcode: BII-101
Pilot: Kiokuma Okajima
Pearl Harbor, 7 December 1941



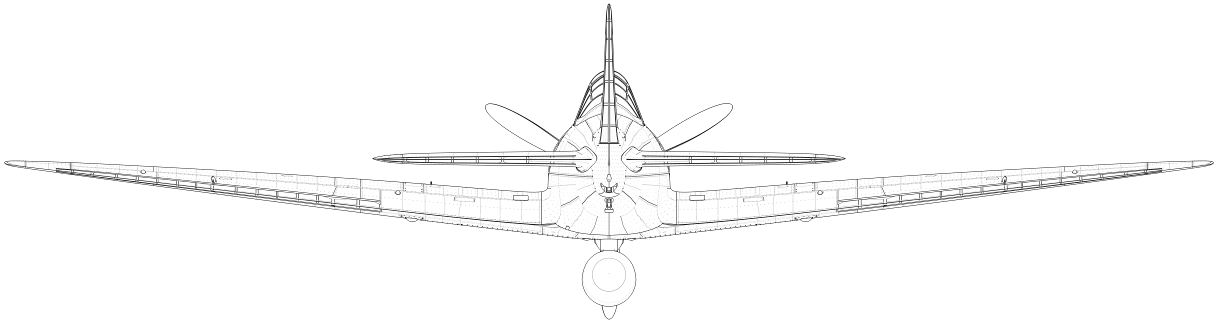


MITSUBISHI TYPE 0 CARRIER FIGHTER MODEL 21 (1/75 SCALE)

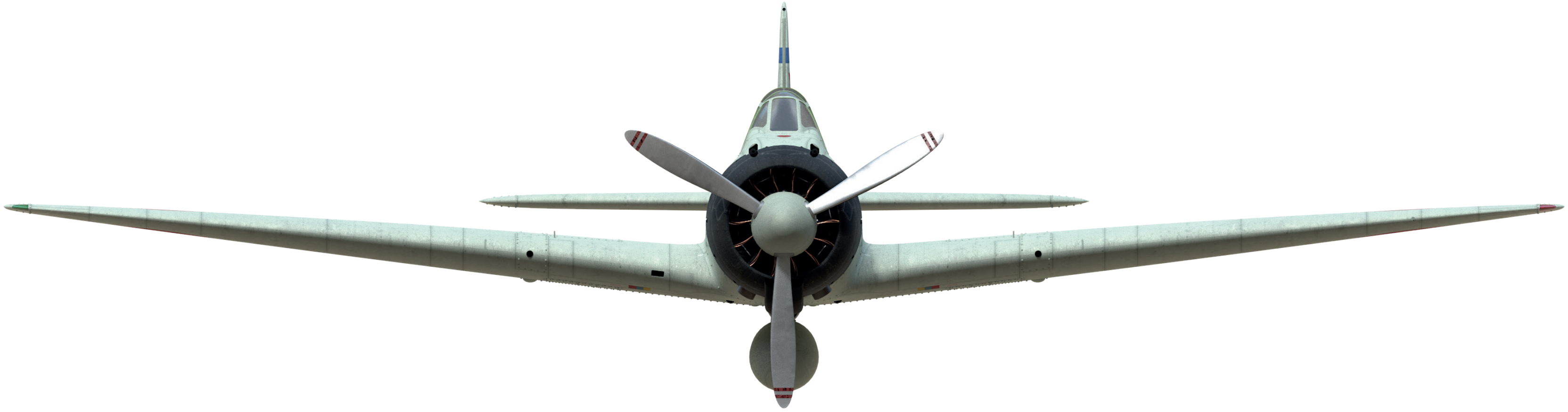
H1/4 FRONT VIEW
H1/5 BACK VIEW

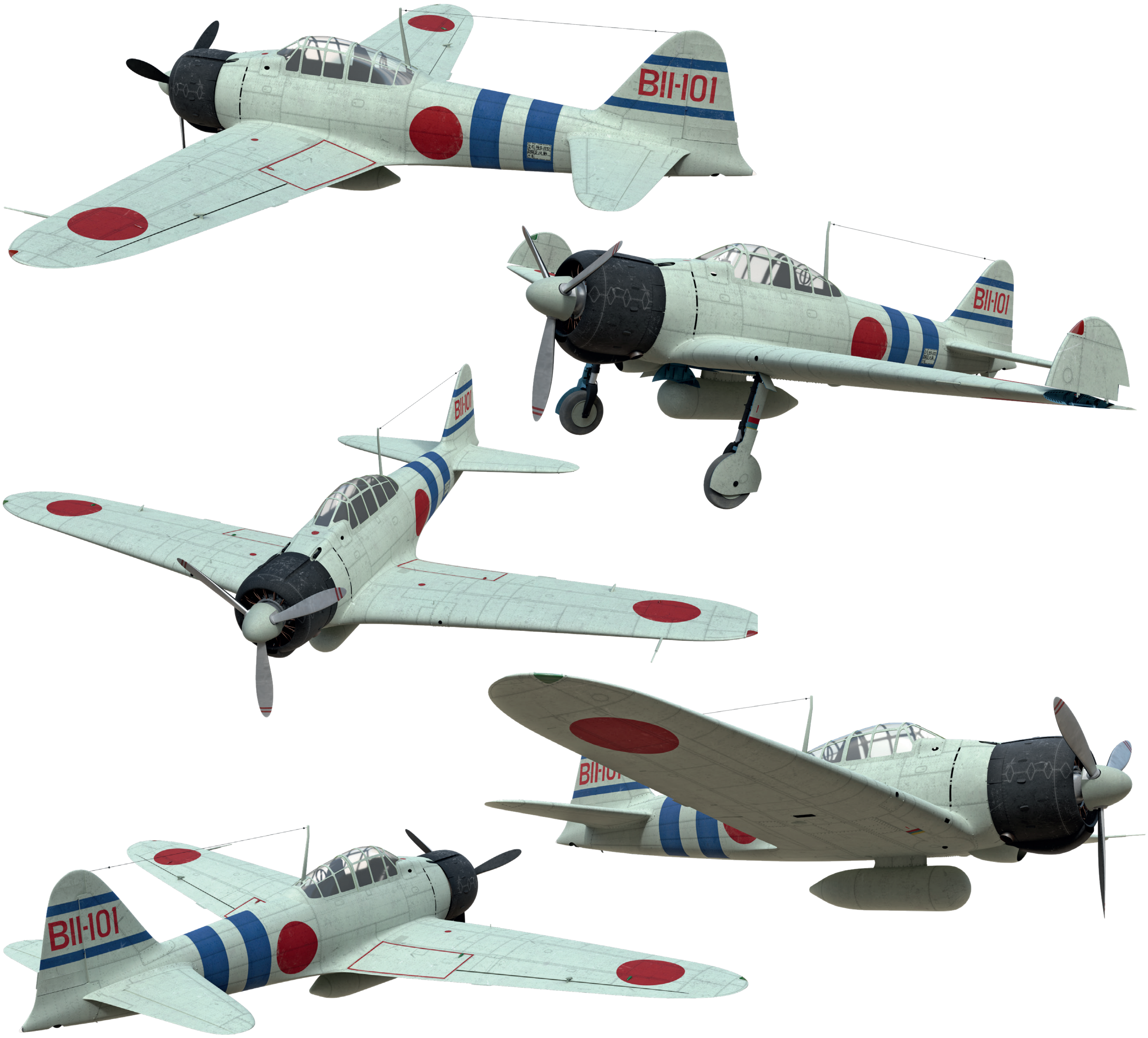


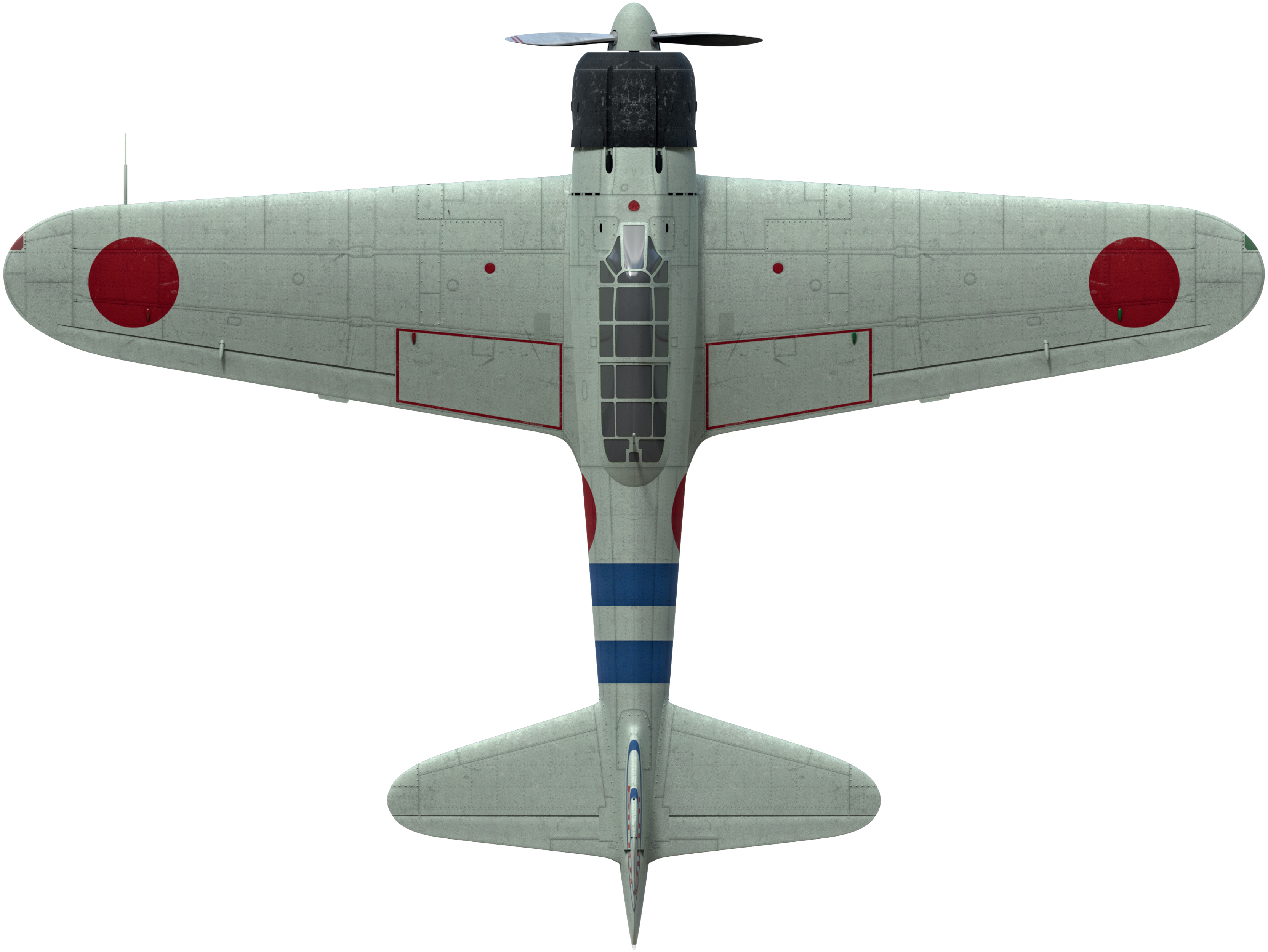
H1/4

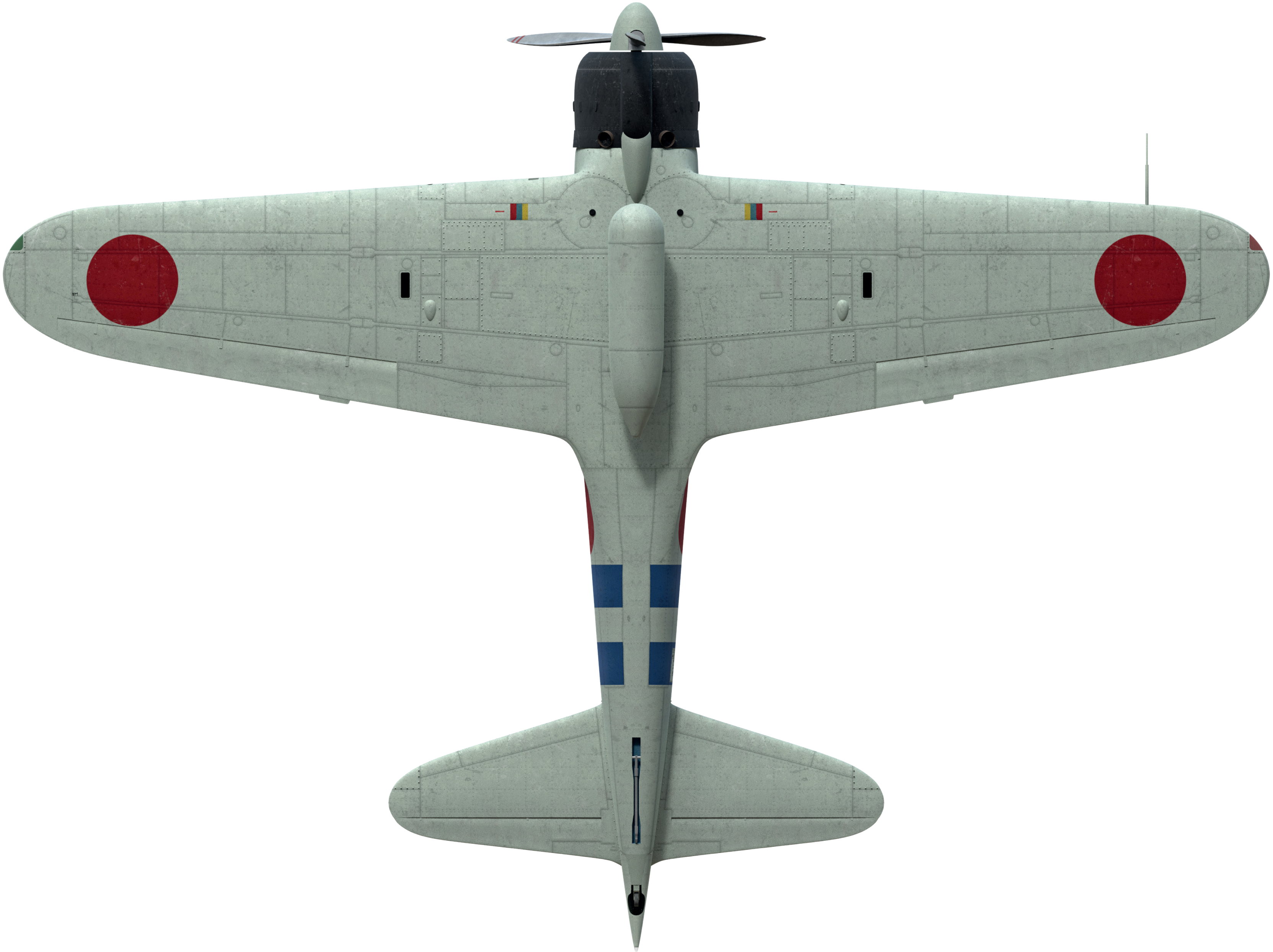


H1/5



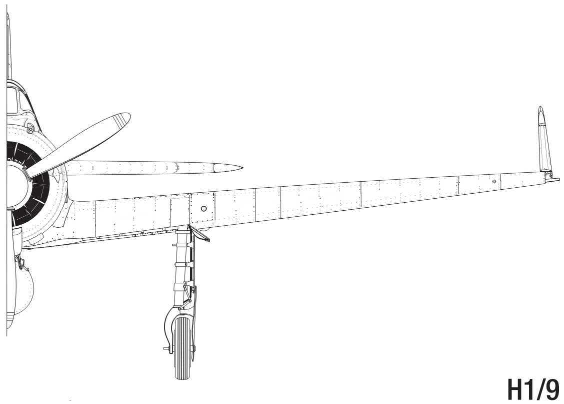

BII-101



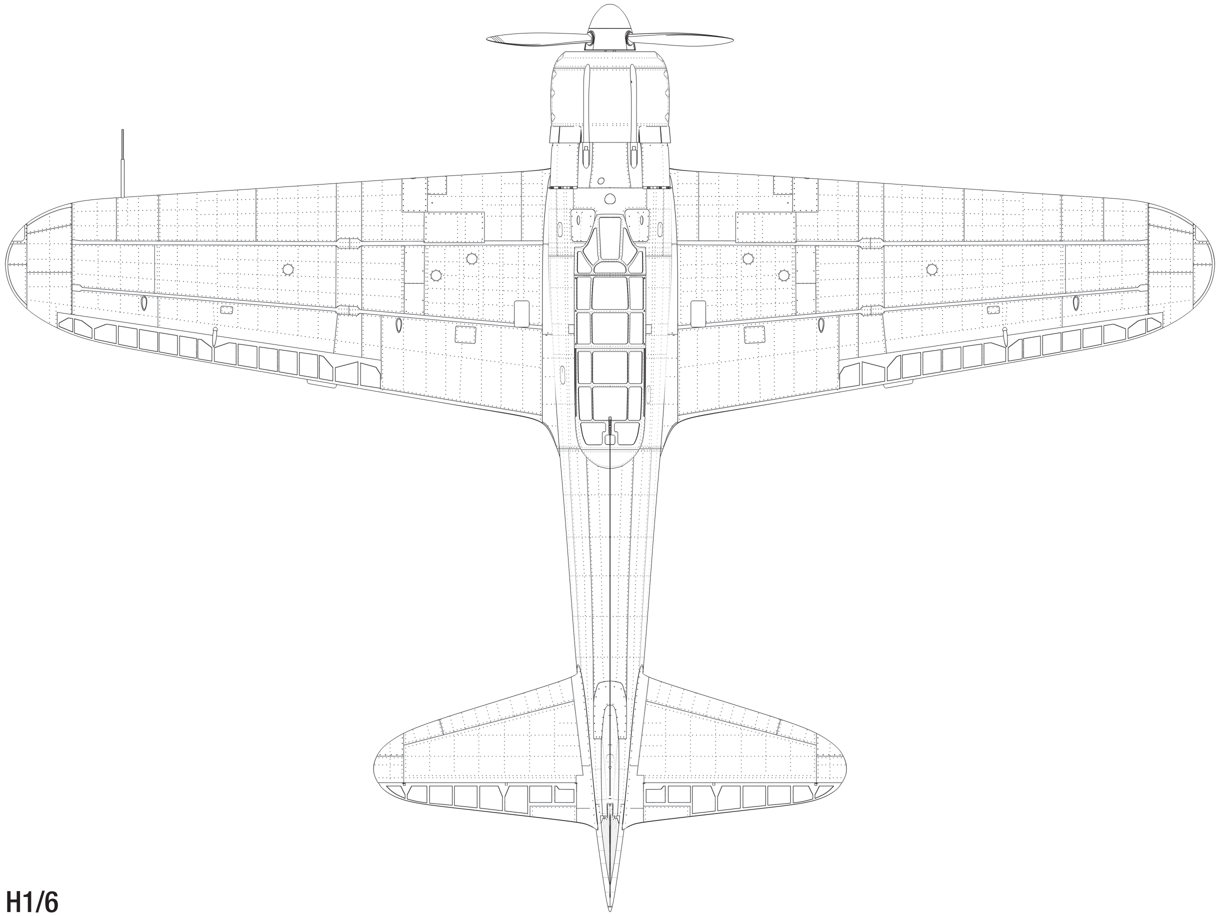


MITSUBISHI TYPE 0 CARRIER FIGHTER MODEL 21 (1/75 SCALE)

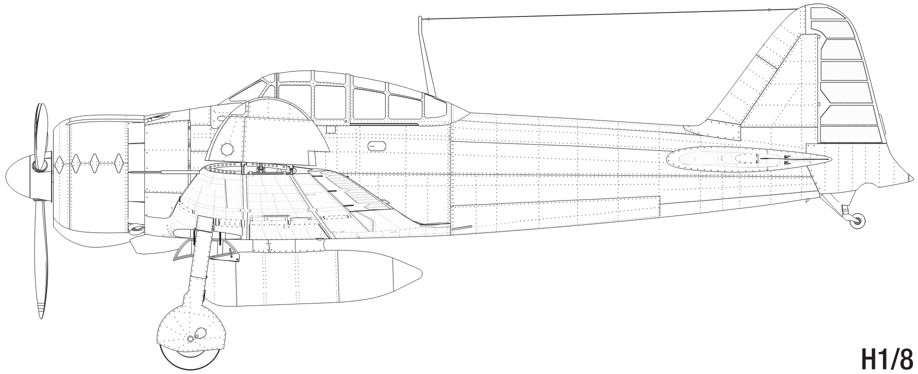
H1/6 PLAN
H1/7 BOTTOM VIEW
H1/8 LEFT PROFILE WITH WINGTIPS FOLDED AND LANDING GEAR LOWERED
H1/9 FRONT VIEW WITH WINGTIPS FOLDED AND LANDING GEAR LOWERED (FRAGMENT)



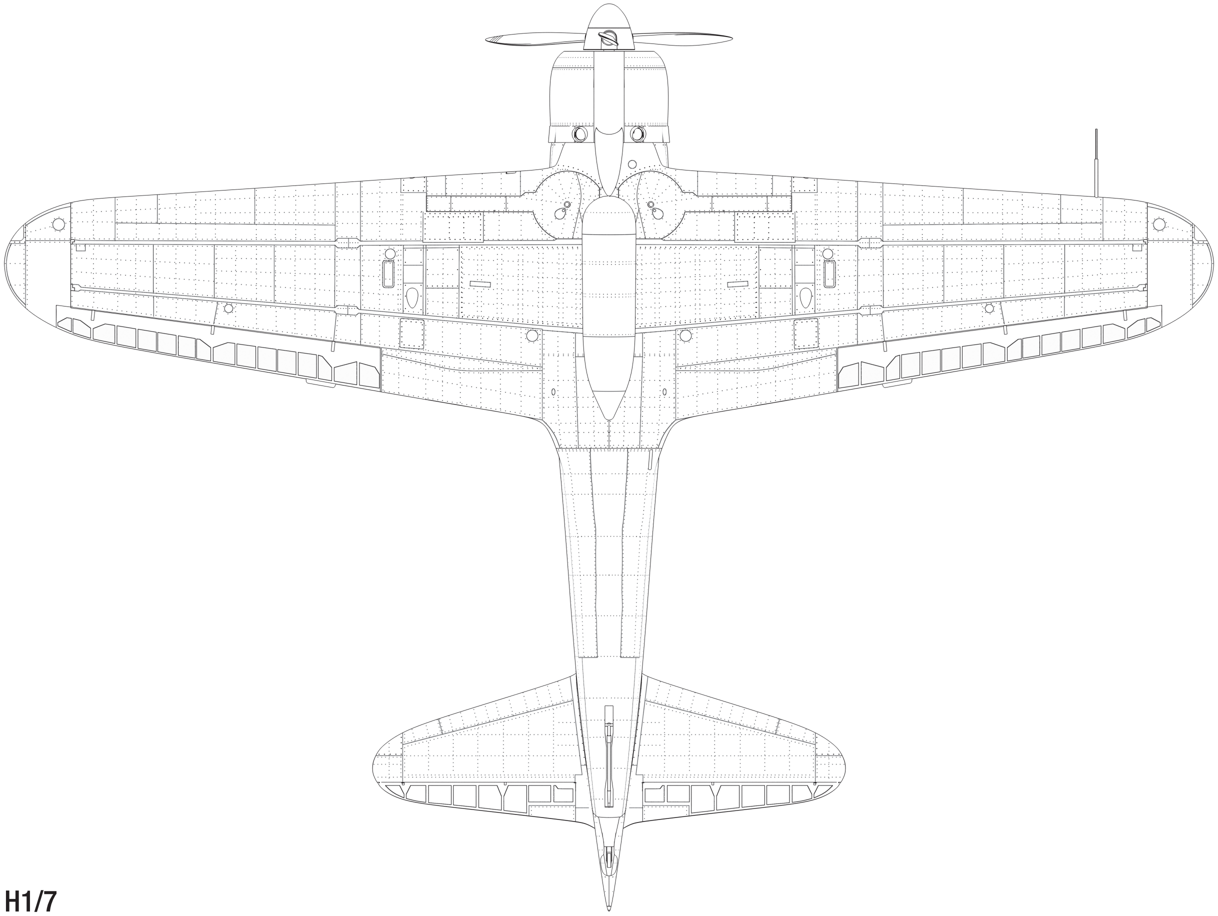
H1/9



H1/6



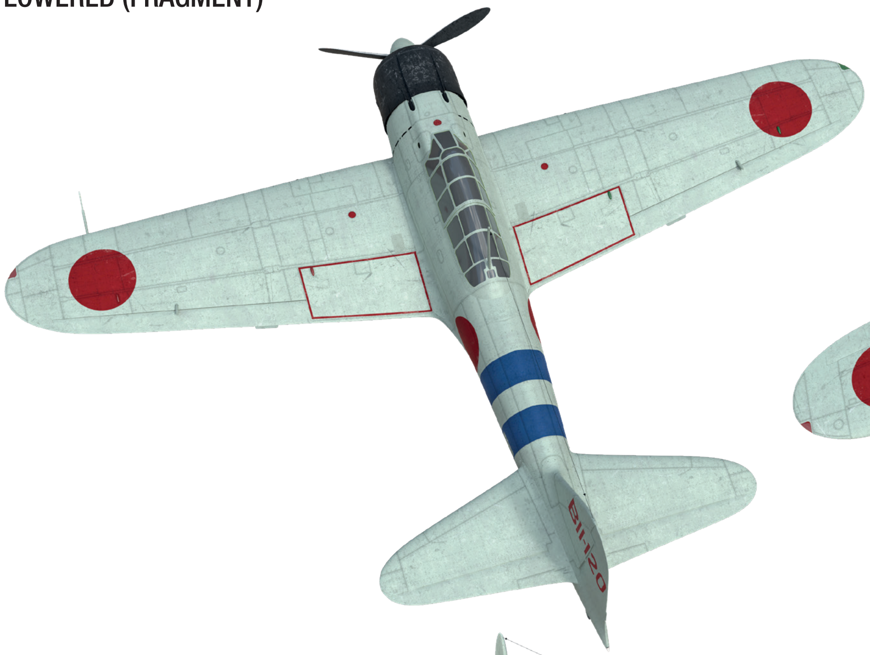
H1/8

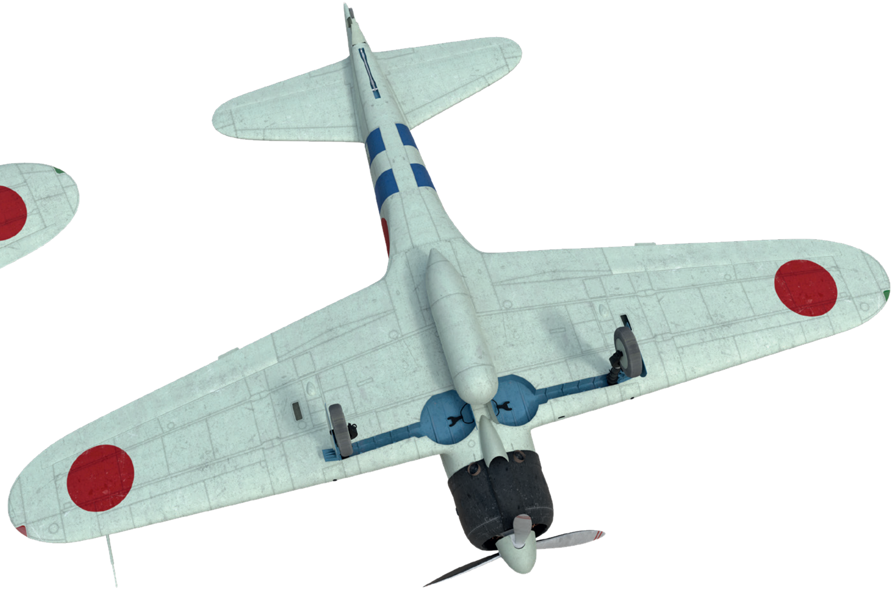


H1/7

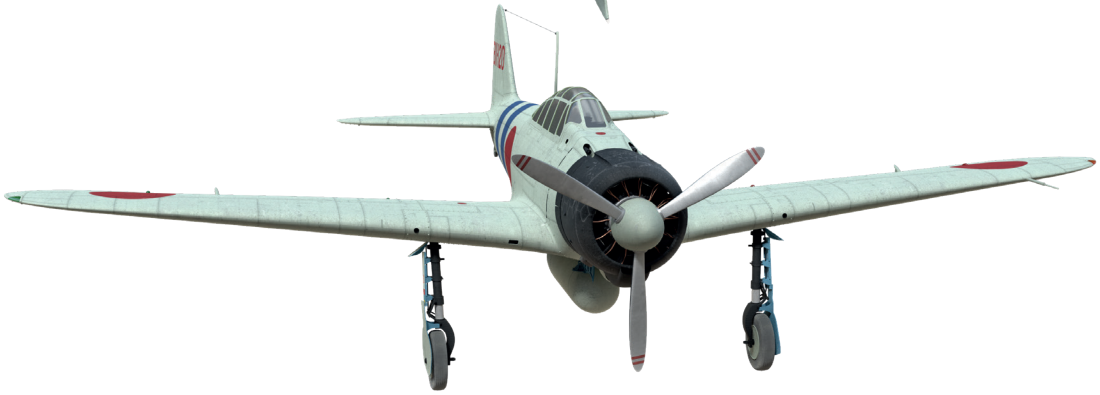
MITSUBISHI TYPE 0 CARRIER FIGHTER MODEL 21 (1/75 SCALE)

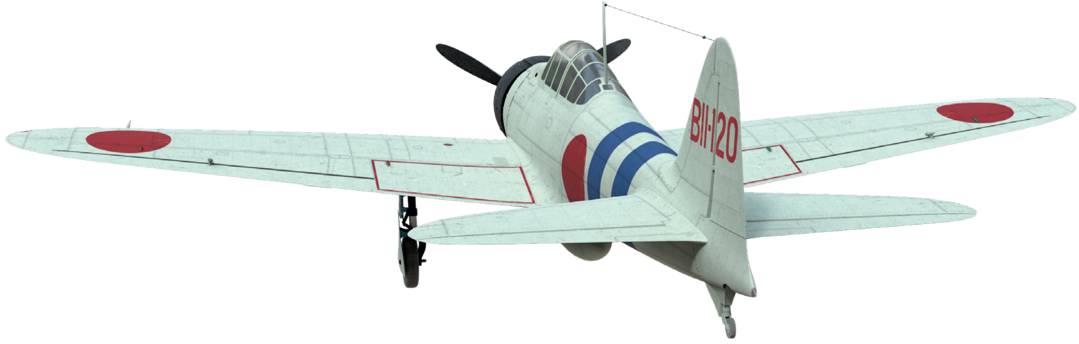
H1/10 BOTTOM VIEW WITH WINGTIPS FOLDED AND LANDING GEAR LOWERED (FRAGMENT)

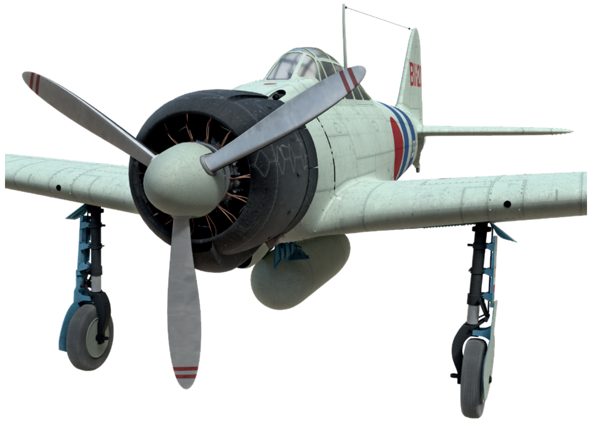




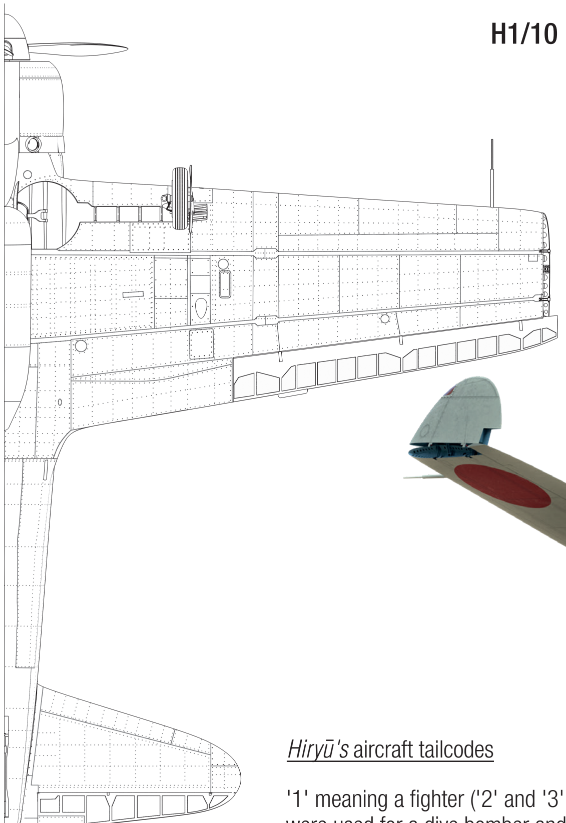
Tailcode: BII-120
Pilot: Shigenori Nishikaichi
Pearl Harbor, 7 December 1941

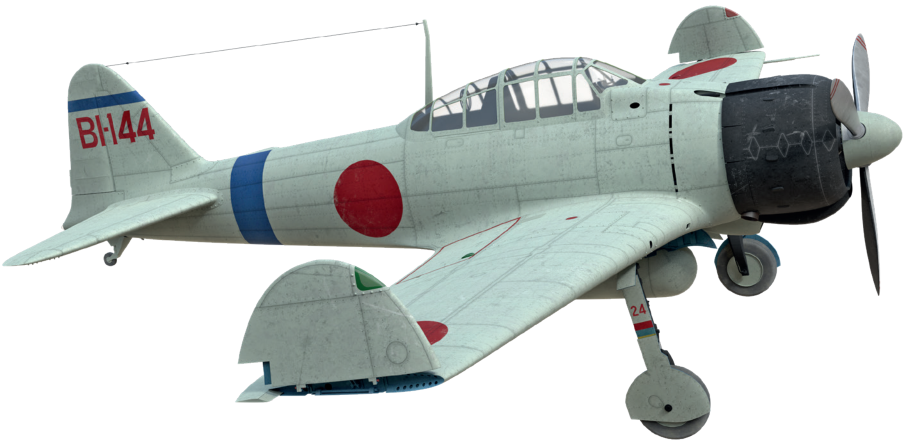


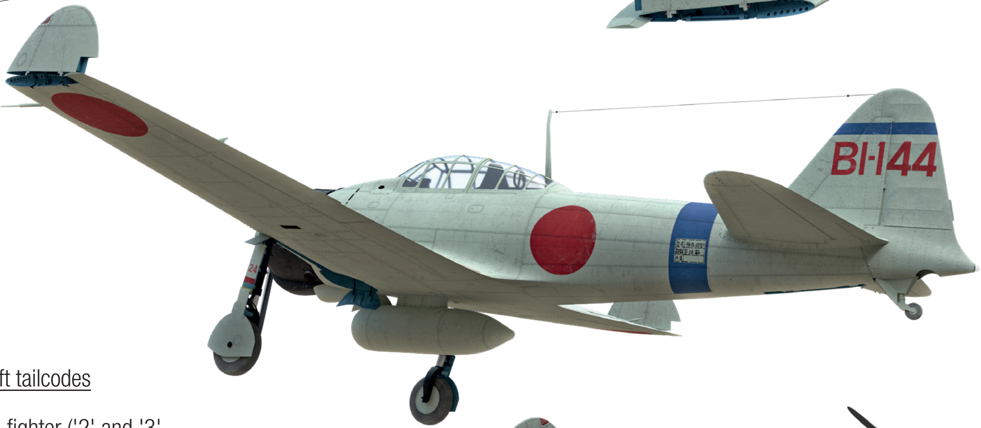




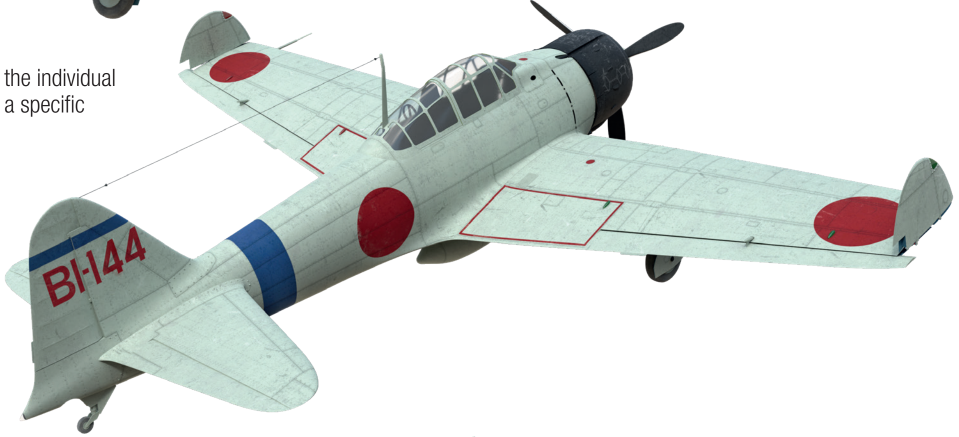
H1/10



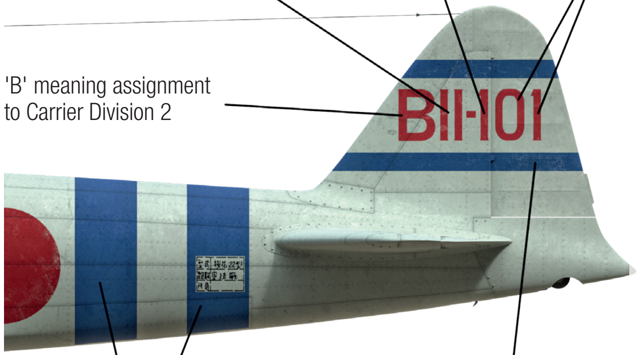




Tailcode: BI-144
Midway, 4 June 1942



Hiryū's aircraft tailcodes



'1' meaning a fighter ('2' and '3' were used for a dive bomber and an attack aircraft respectively)

'01' being the individual number of a specific aircraft

'II' meaning the second ship in her division (most probably changed to 'I' before Midway)

'B' meaning assignment to Carrier Division 2

two vertical bands meaning the second ship of her division, blue colour meaning Carrier Division 2 (most probably changed to one blue band before Midway)

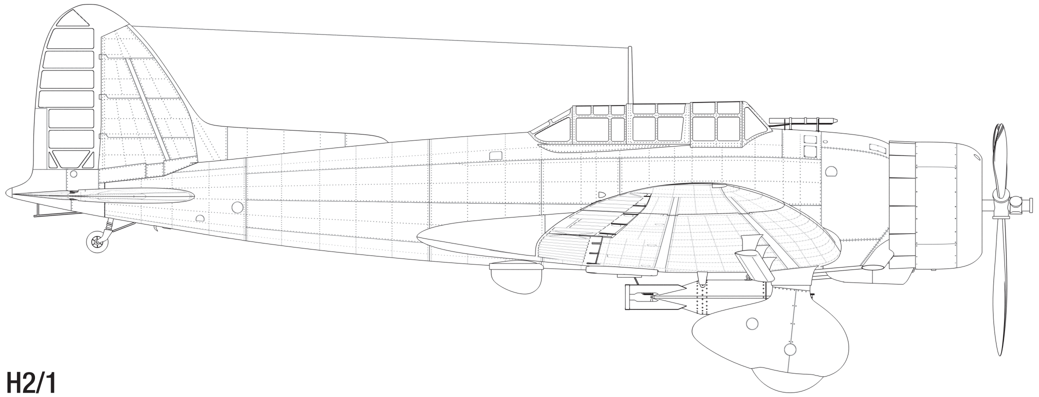
two horizontal bands meaning assignment to a buntaichō (one band was used for a shōtaichō and three bands for a hikōtaichō; various colours were used)

AICHI TYPE 99 CARRIER BOMBER MODEL 11 (1/75 SCALE)
愛知九九式艦上爆撃機一一型 – AICHI KYŪKYŪ SHIKI KANJŌ BAKUGEKIKI ICHIICHI GATA

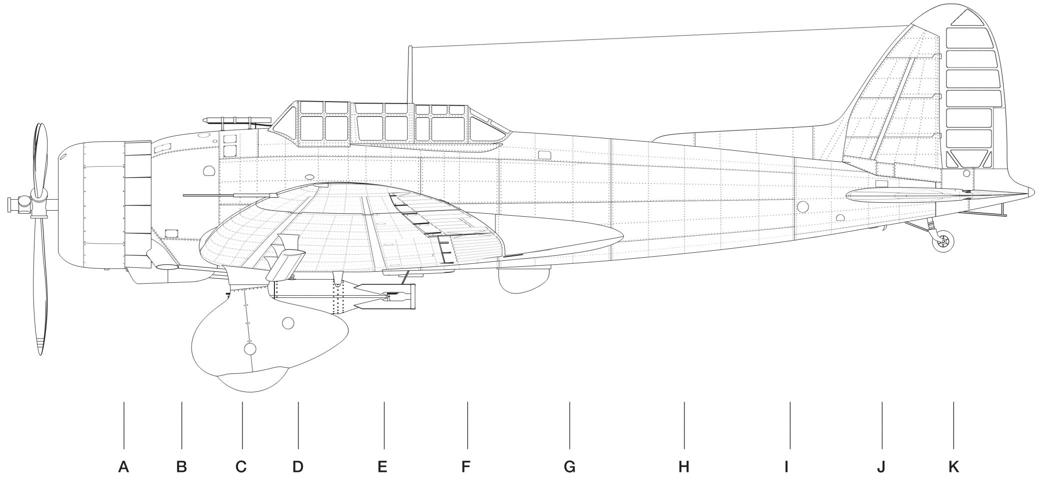
ALSO KNOWN AS: AICHI D3A1

ALLIED CODENAME: *VAL*

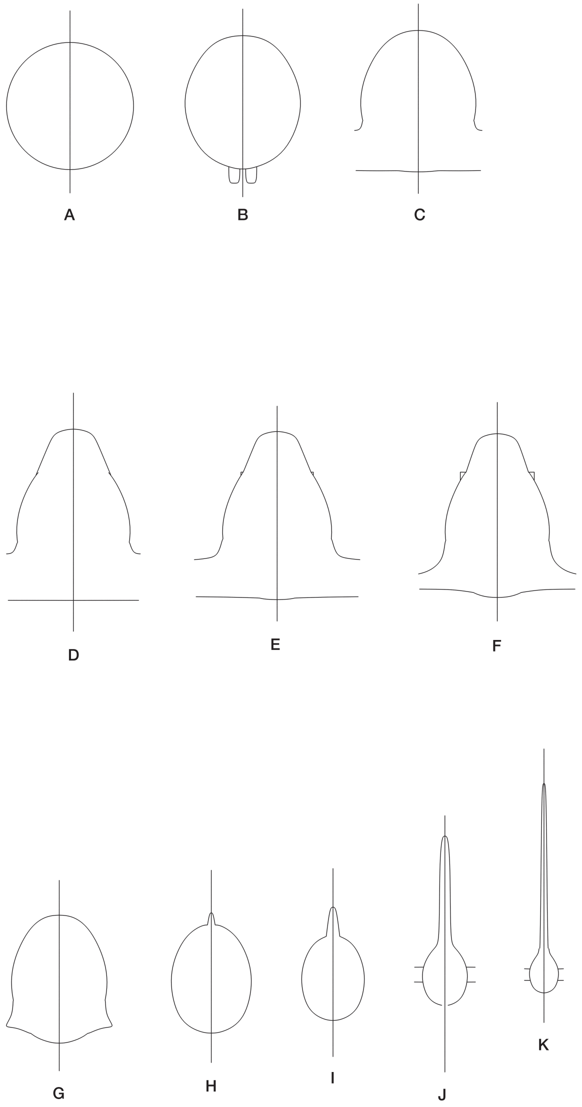
H2/1 RIGHT PROFILE
H2/2 LEFT PROFILE
H2/3 FUSELAGE SECTIONS



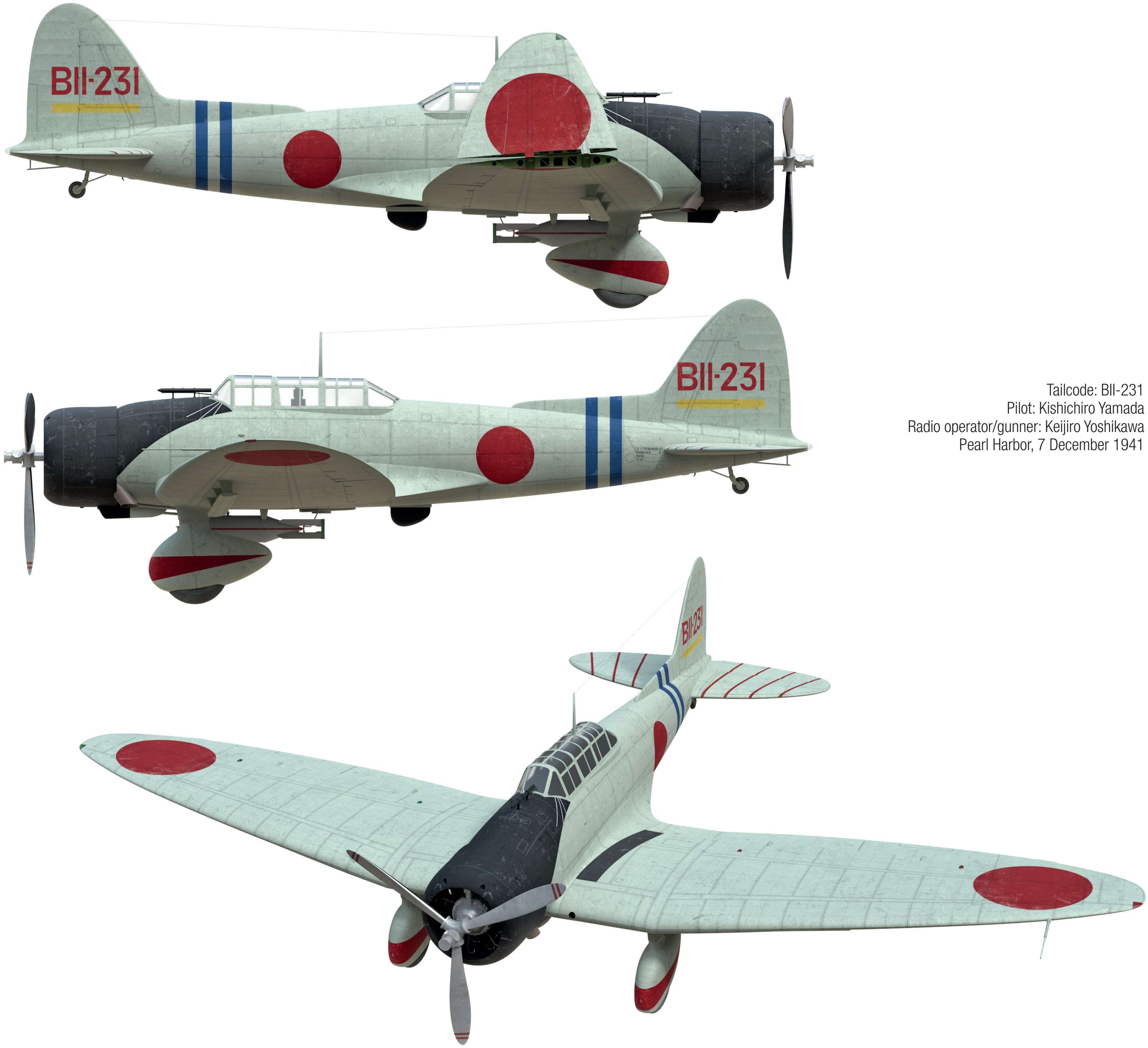
H2/1



H2/2



H2/3

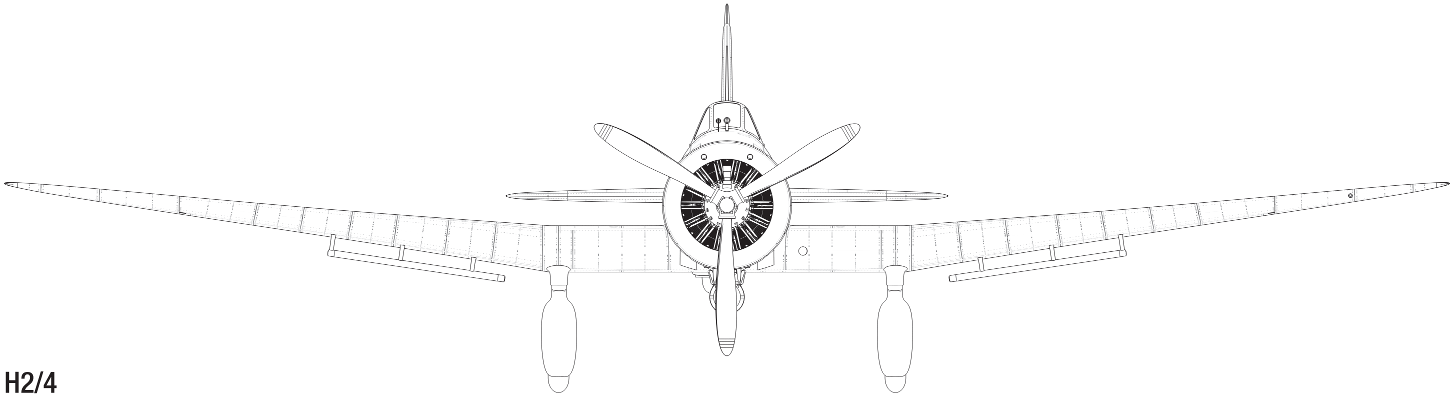

BII-231
BII-231
BII-231

Tailcode: BII-231
Pilot: Kishichiro Yamada
Radio operator/gunner: Keijiro Yoshikawa
Pearl Harbor, 7 December 1941

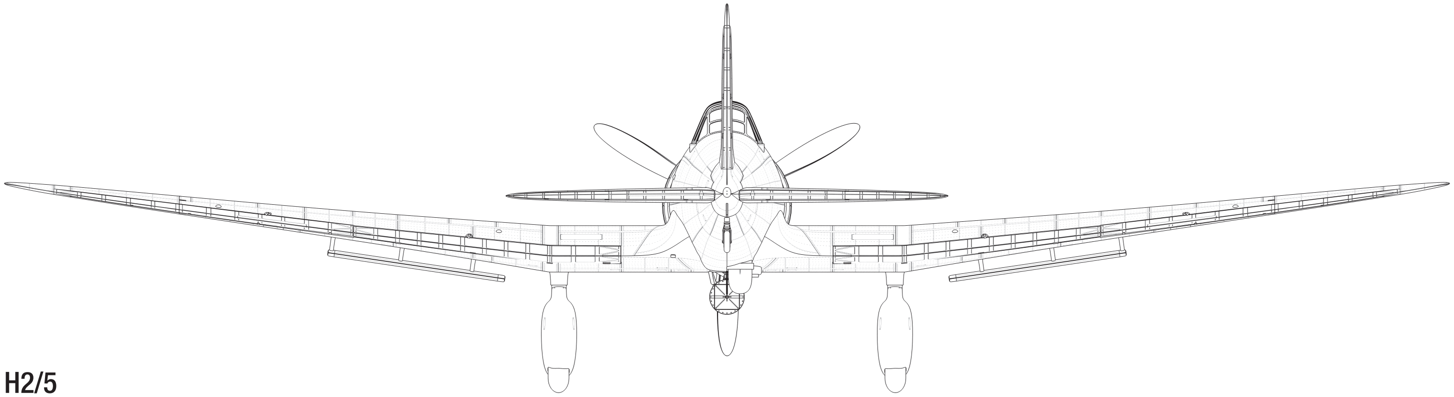
AICHI TYPE 99 CARRIER BOMBER MODEL 11 (1/75 SCALE)

H2/4 FRONT VIEW

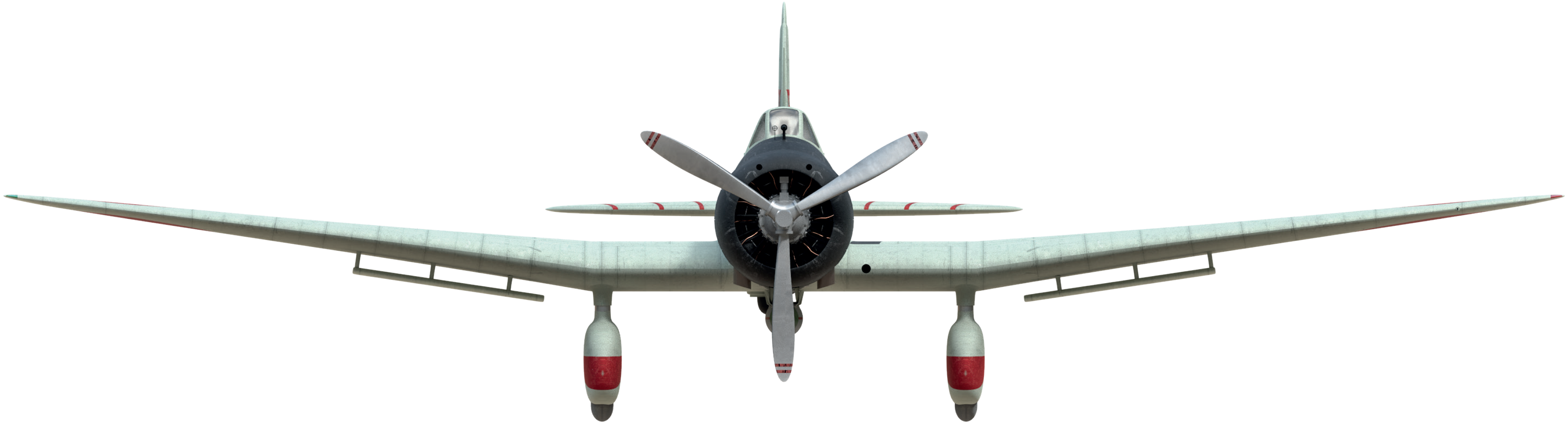
H2/5 BACK VIEW



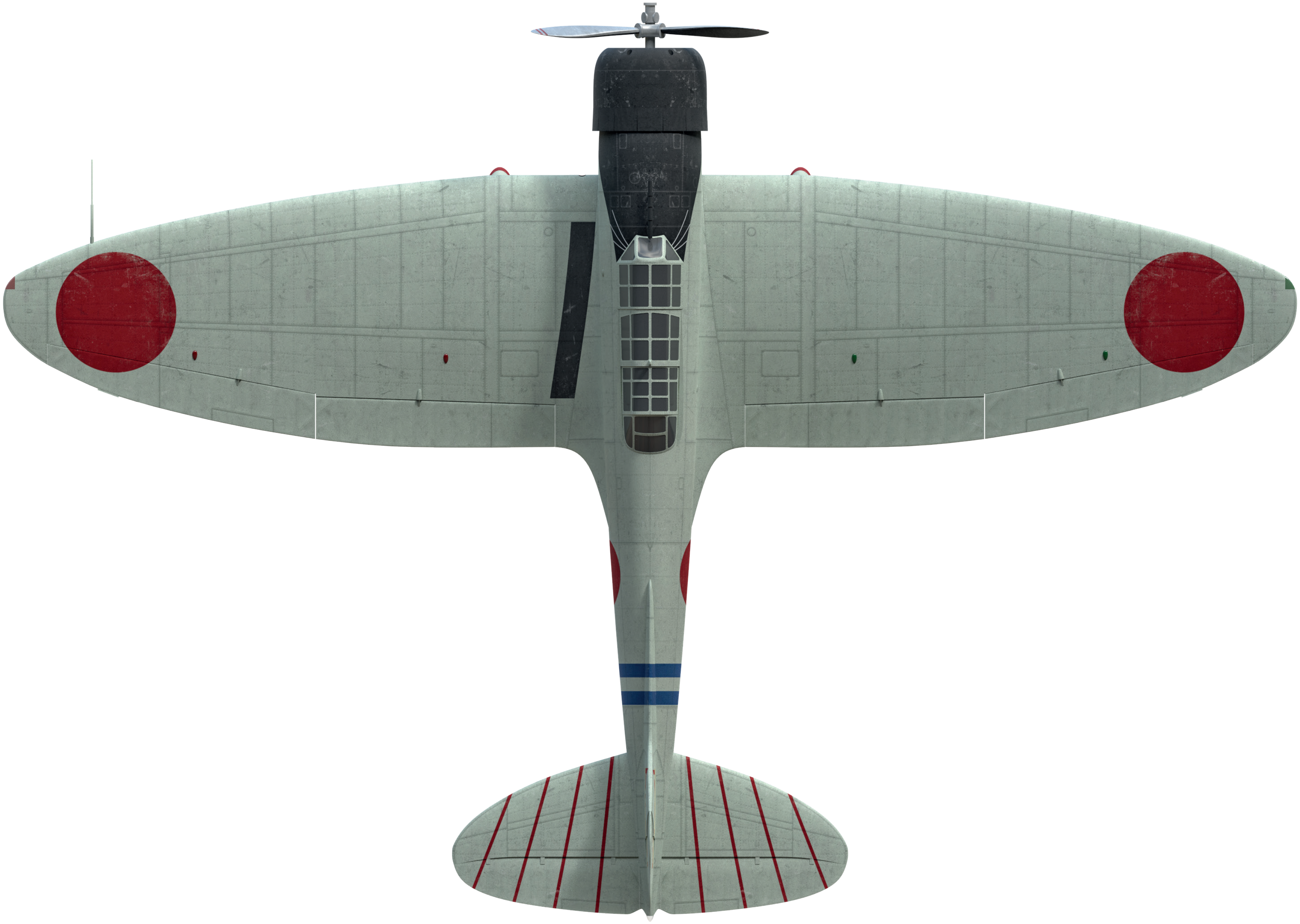
H2/4

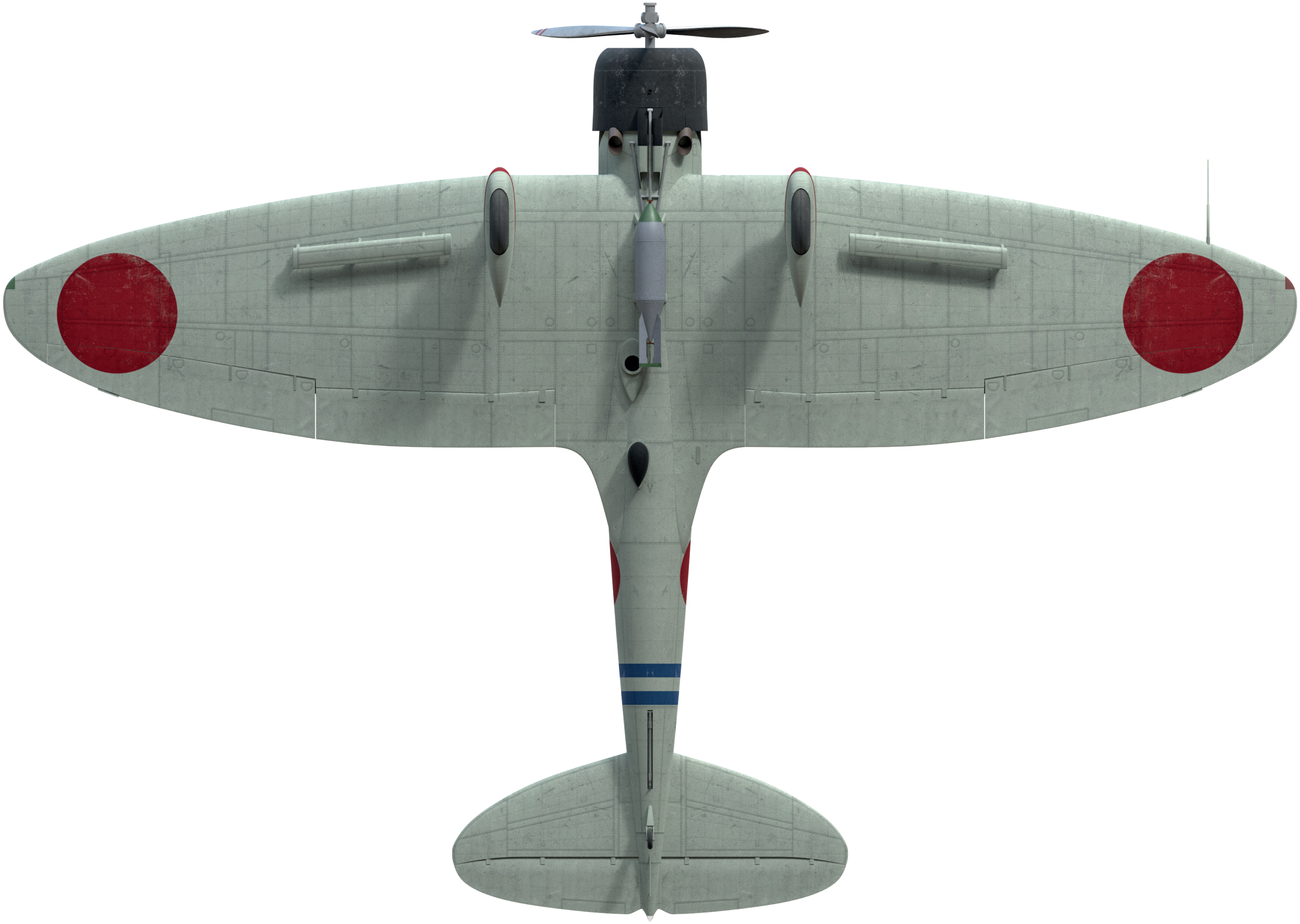


H2/5



BII-231
BII-231
BII-231
BII-231





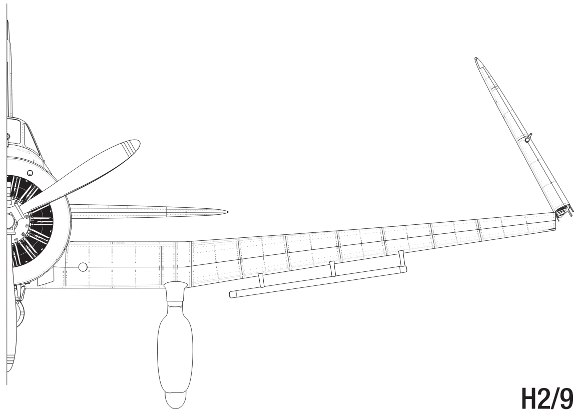
AICHI TYPE 99 CARRIER BOMBER MODEL 11 (1/75 SCALE)

H2/6 PLAN

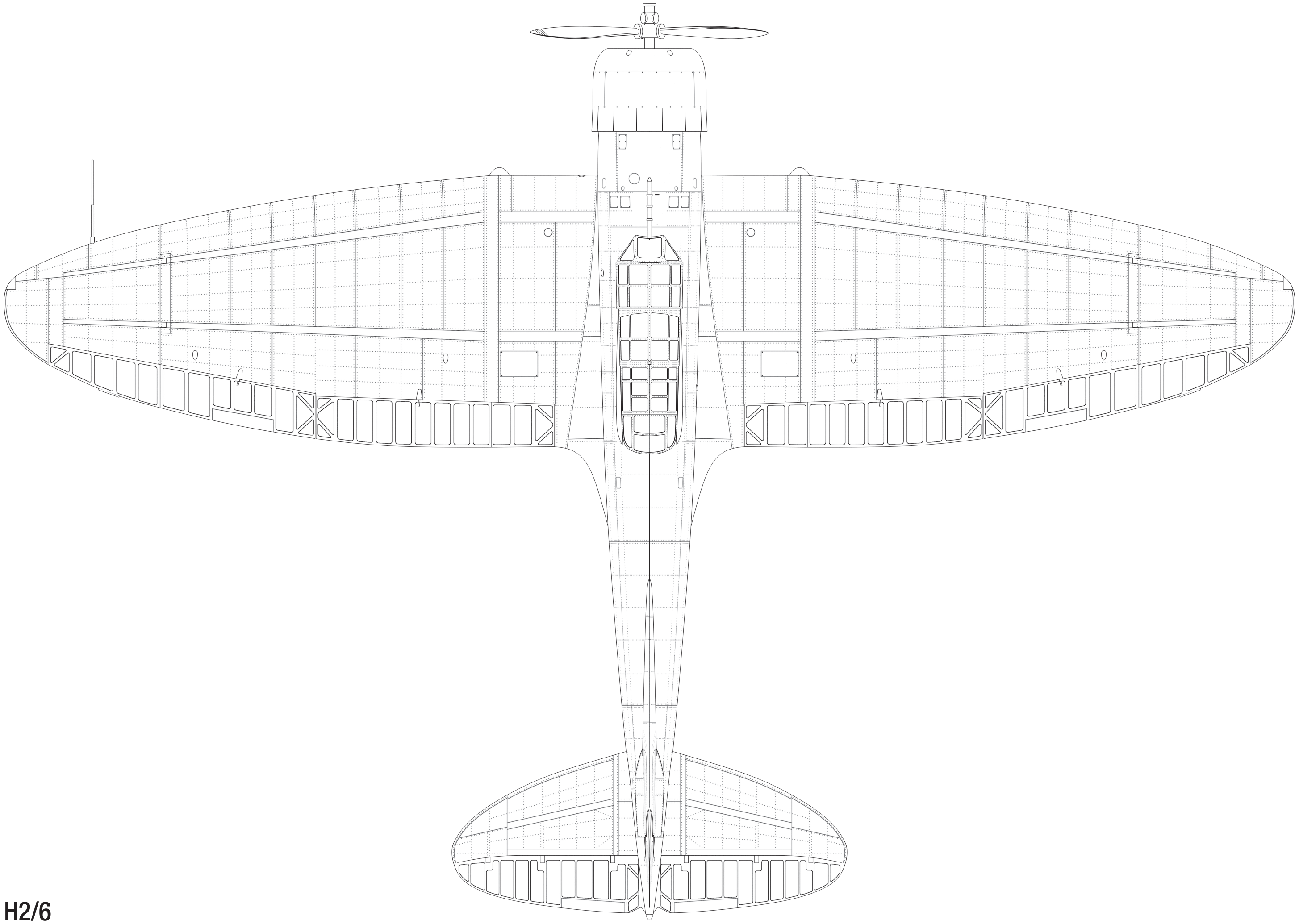
H2/7 BOTTOM VIEW

H2/8 LEFT PROFILE WITH WINGTIPS FOLDED

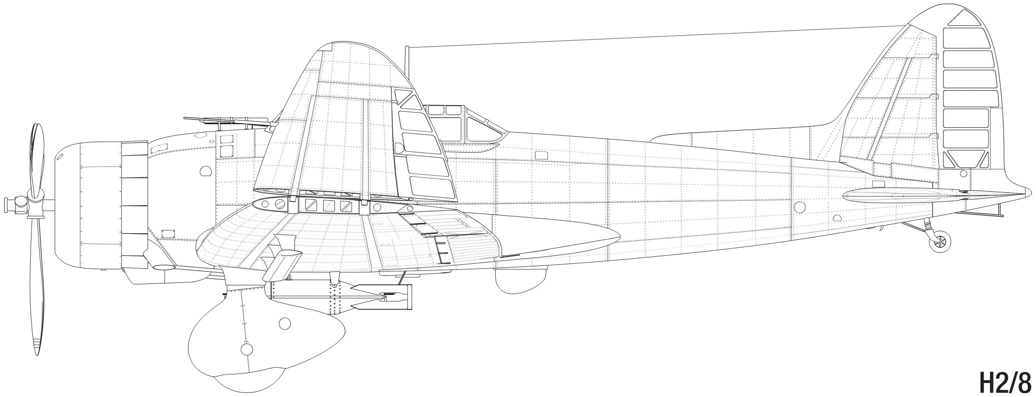
H2/9 FRONT VIEW WITH WINGTIPS FOLDED (FRAGMENT)



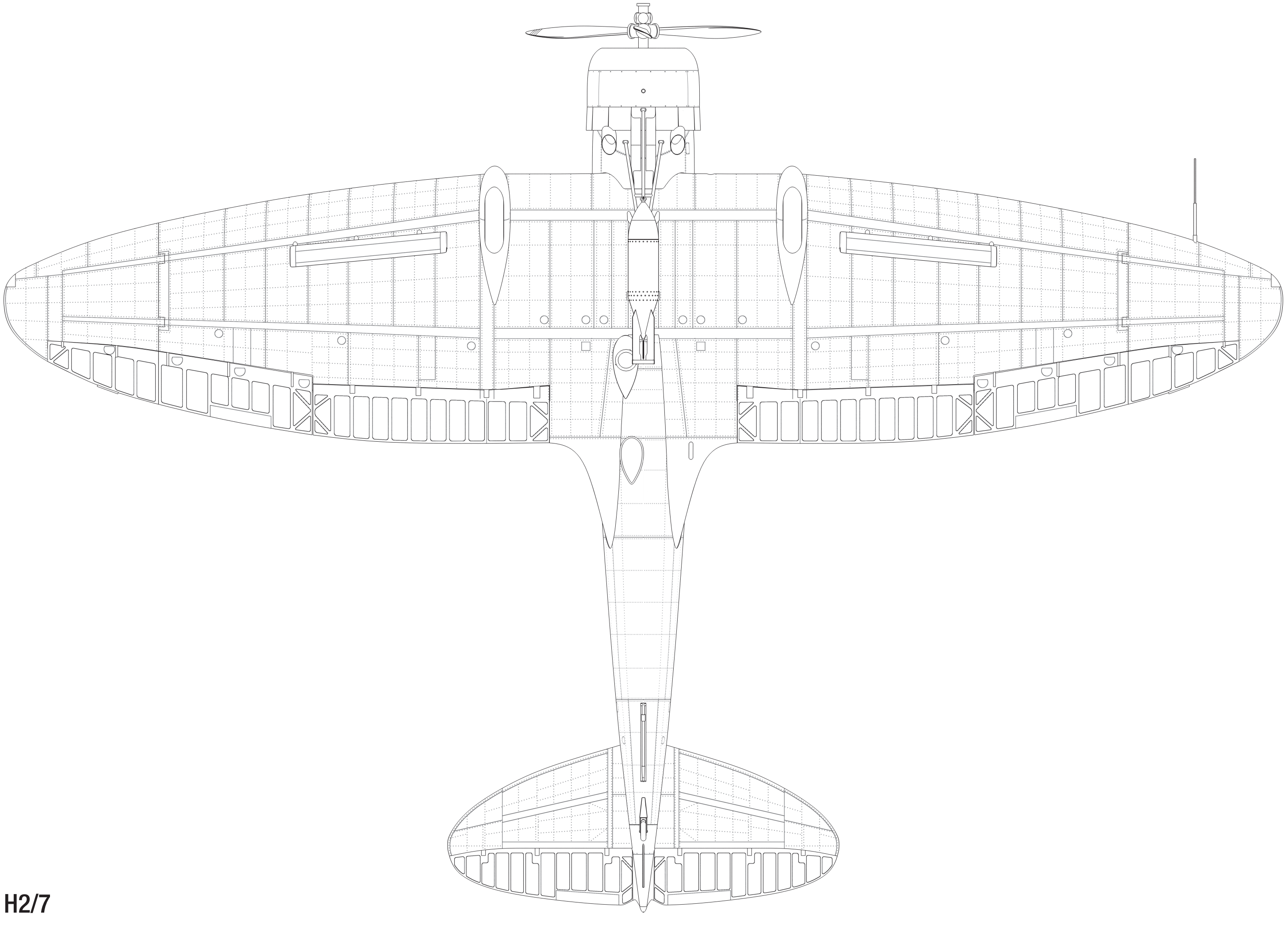
H2/9



H2/6



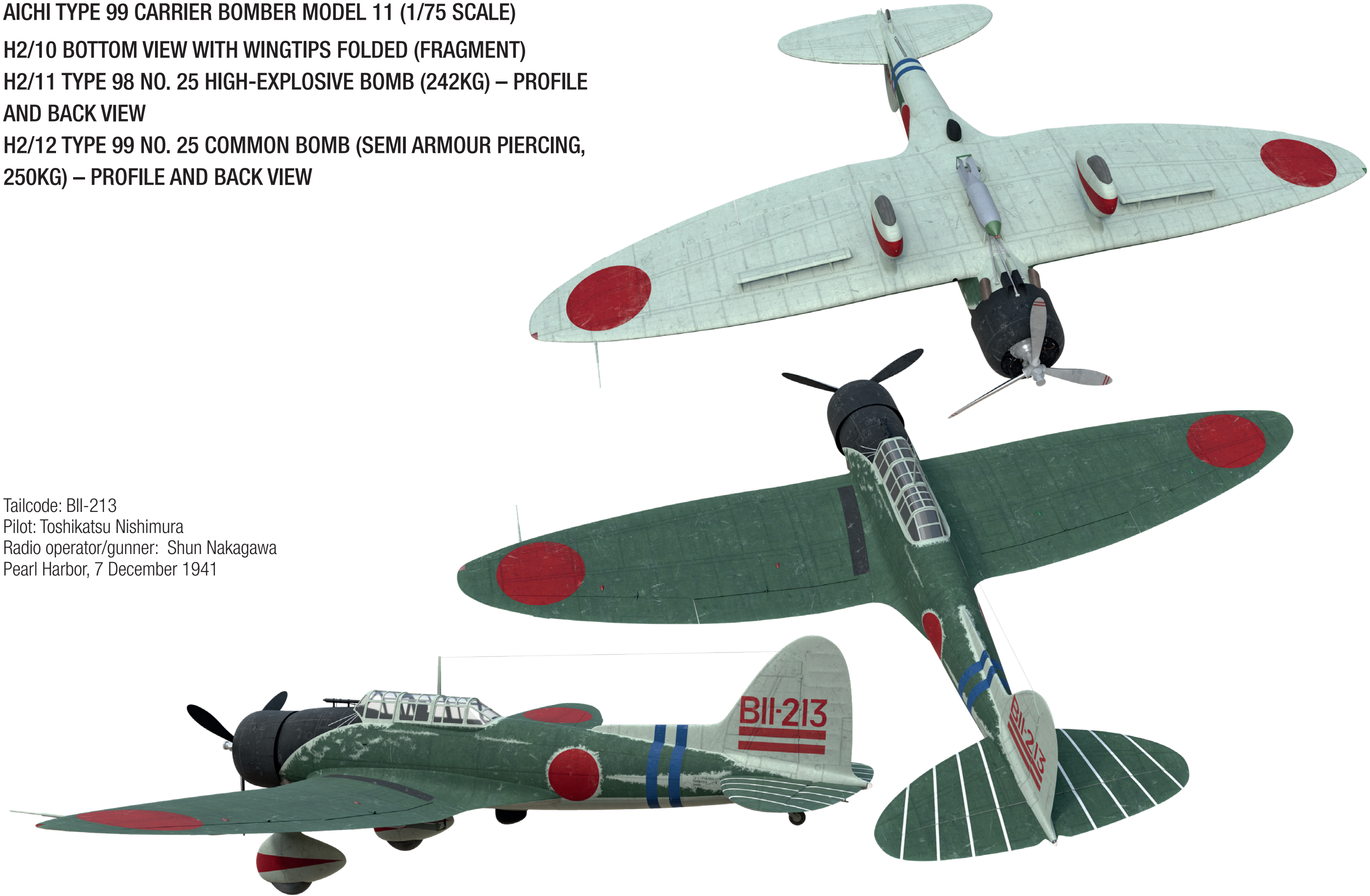
H2/8



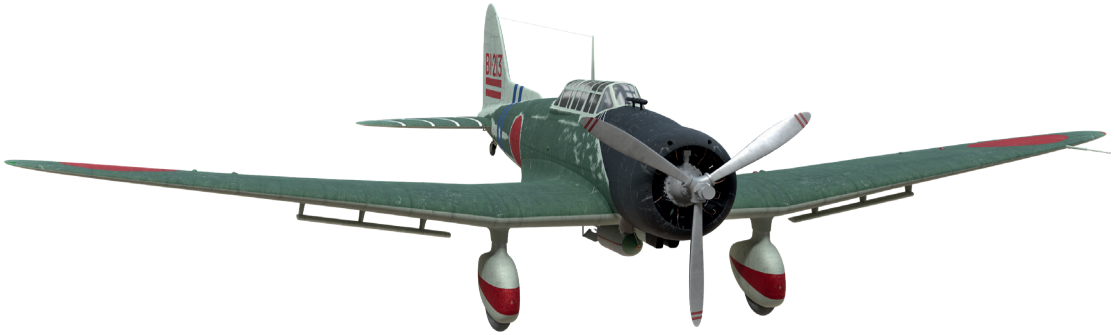
H2/7

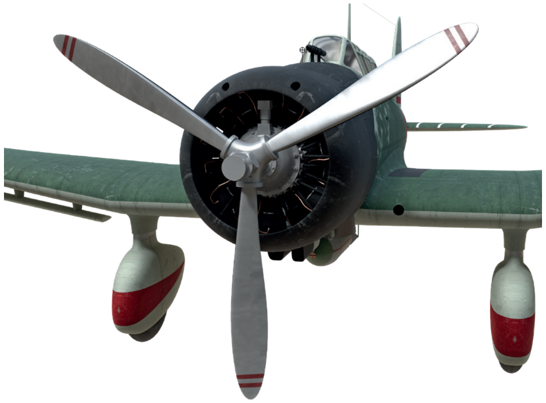
AICHI TYPE 99 CARRIER BOMBER MODEL 11 (1/75 SCALE)

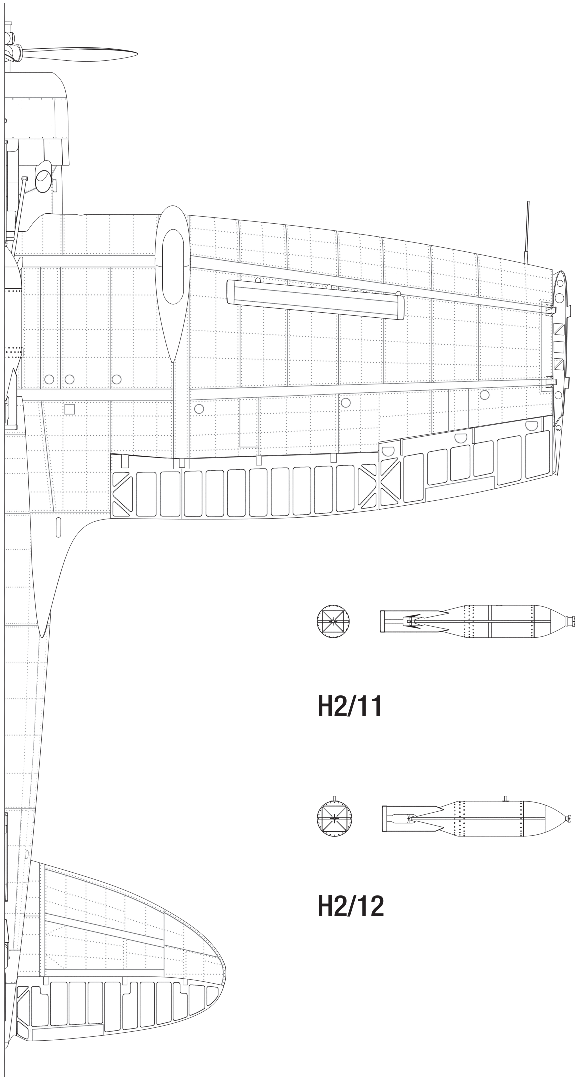
H2/10 BOTTOM VIEW WITH WINGTIPS FOLDED (FRAGMENT)
H2/11 TYPE 98 NO. 25 HIGH-EXPLOSIVE BOMB (242KG) – PROFILE AND BACK VIEW
H2/12 TYPE 99 NO. 25 COMMON BOMB (SEMI ARMOUR PIERCING, 250KG) – PROFILE AND BACK VIEW



Tailcode: BII-213
Pilot: Toshikatsu Nishimura
Radio operator/gunner: Shun Nakagawa
Pearl Harbor, 7 December 1941

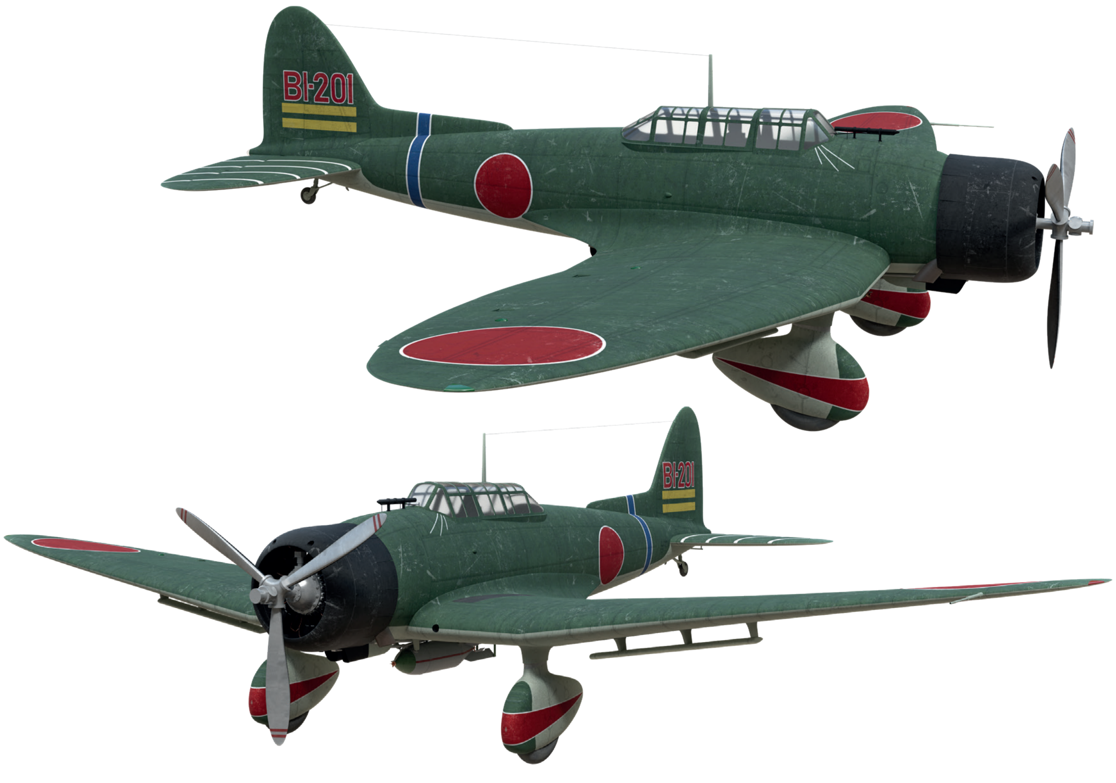


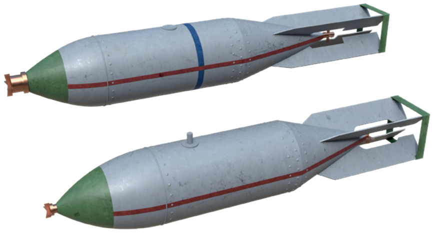


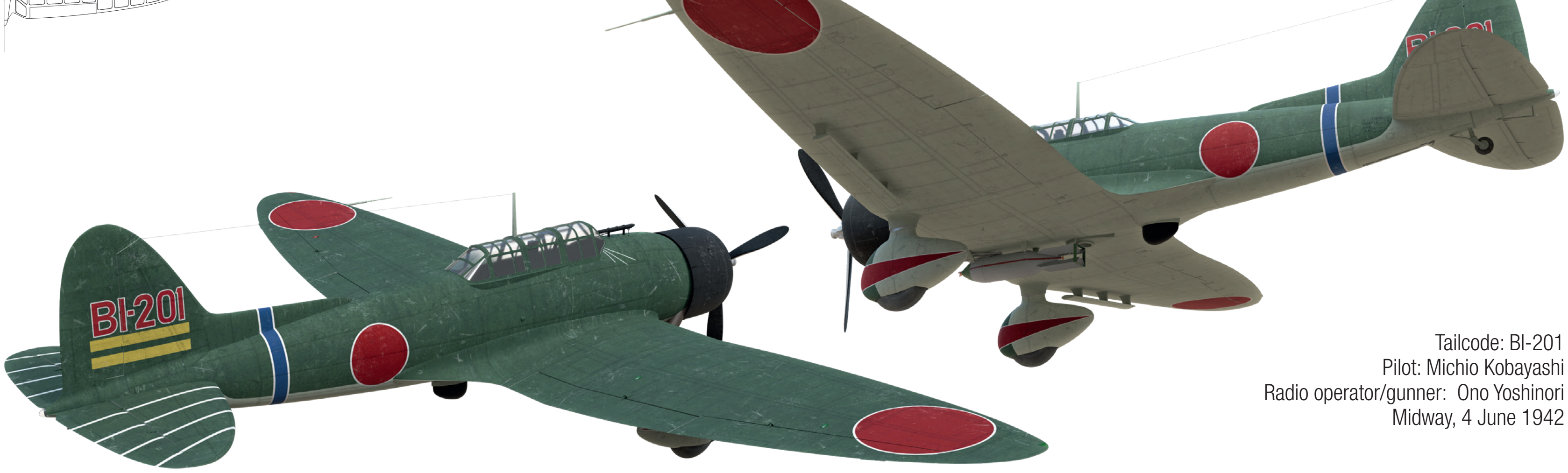


H2/11

H2/12







Tailcode: BI-201
Pilot: Michio Kobayashi
Radio operator/gunner: Ono Yoshinori
Midway, 4 June 1942

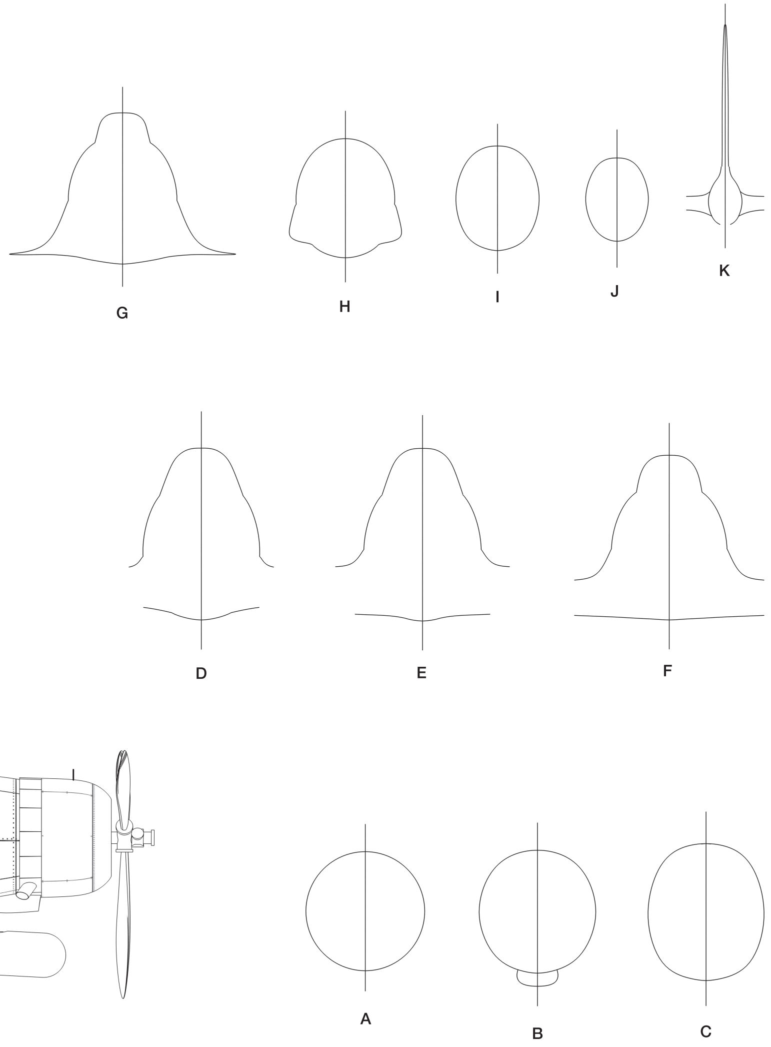
NAKAJIMA TYPE 97 CARRIER ATTACK AIRCRAFT MODEL 12 (1/75 SCALE)

中島九七式艦上攻撃機一二型 – NAKAJIMA KYŪNANA SHIKI KANJŌ KŌGEKIKI ICHINI GATA

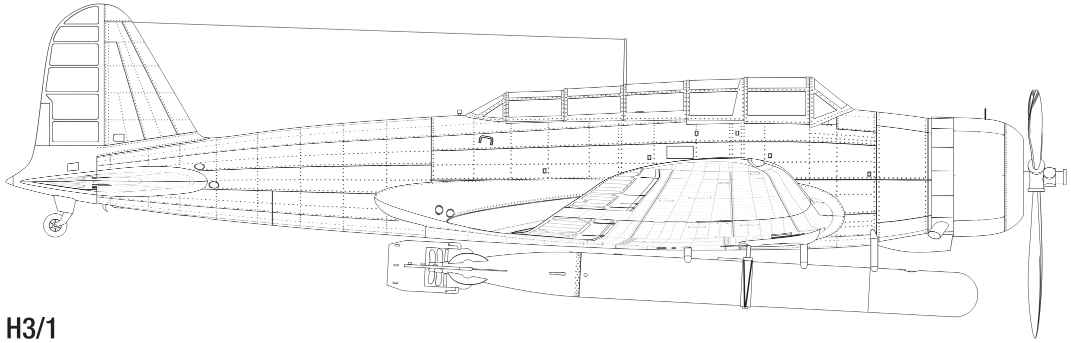
ALSO KNOWN AS: NAKAJIMA B5N2

ALLIED CODENAME: *KATE*

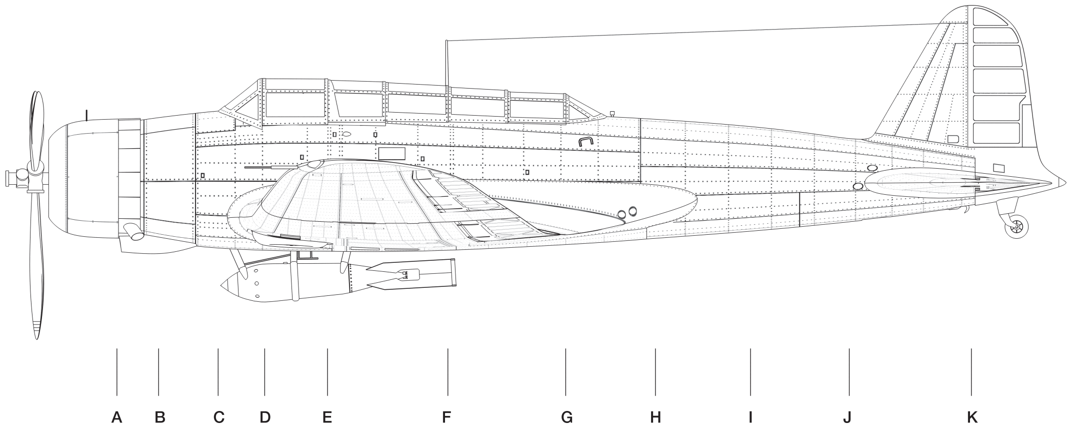
H3/1 RIGHT PROFILE (ARMED WITH A TYPE 91 MOD. 2 TORPEDO)
H3/2 LEFT PROFILE (ARMED WITH A TYPE 99 NO. 80 ARMOUR PIERCING BOMB)
H3/3 FUSELAGE SECTIONS



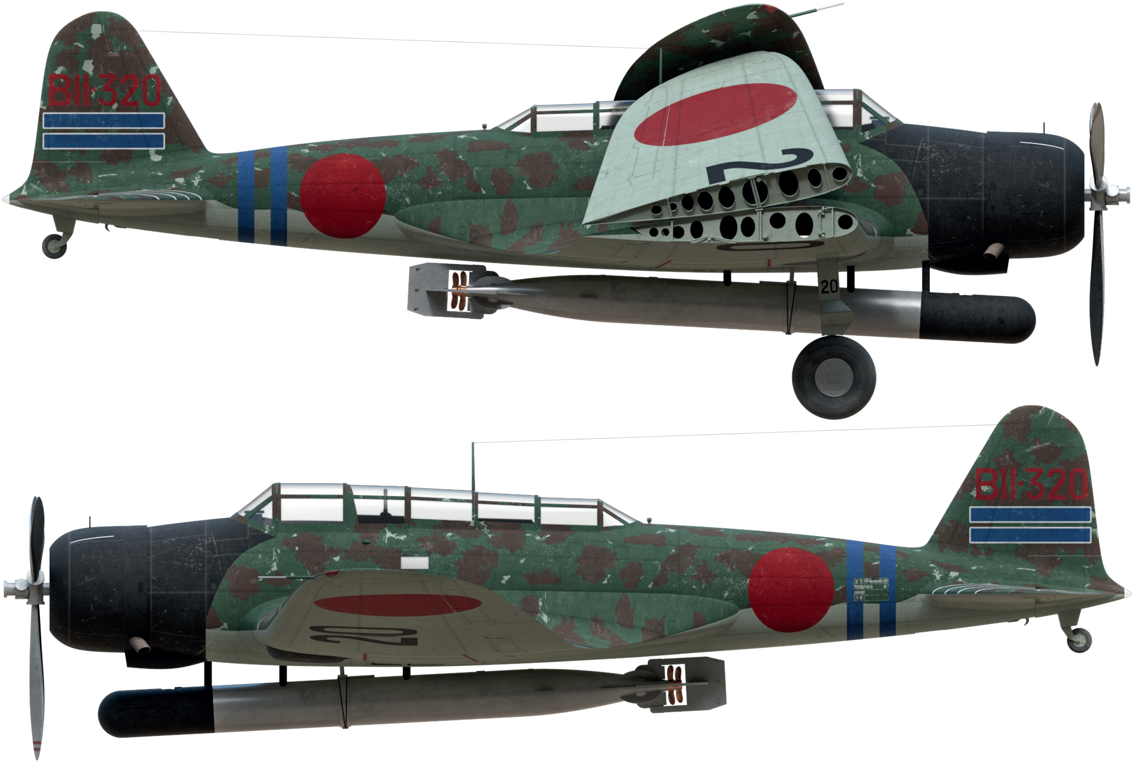
H3/3



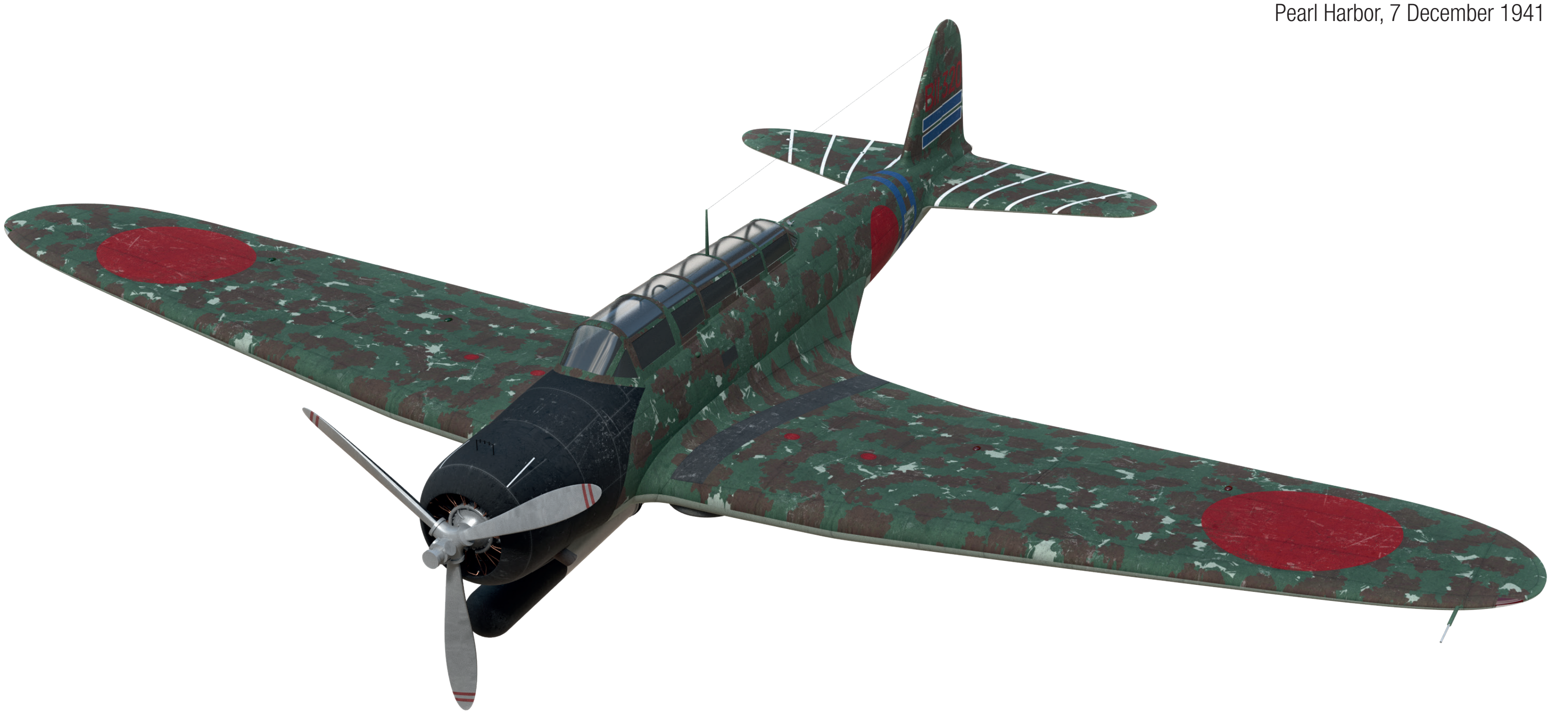
H3/1



H3/2


BII-320
20
BII-320
20

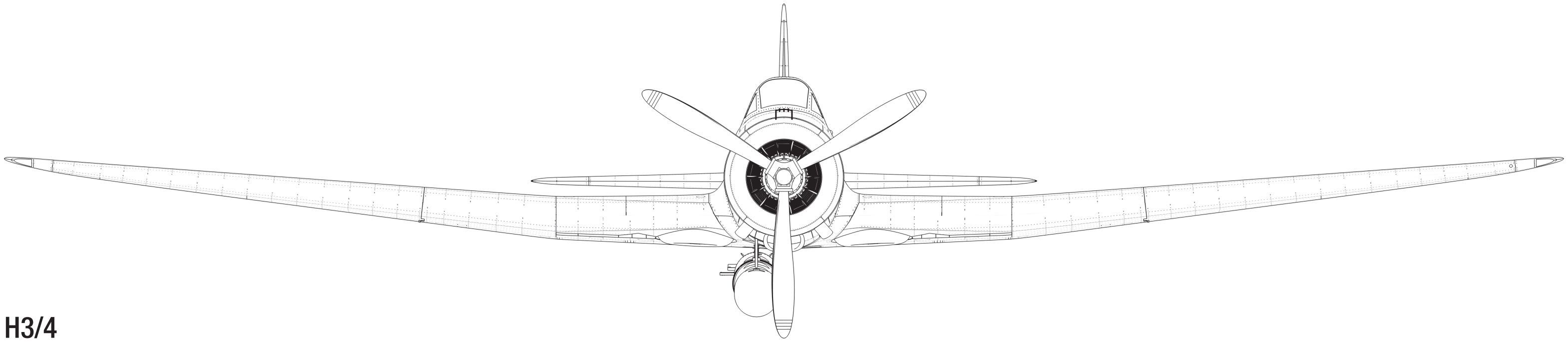
Tailcode: BII-320
Pilot: Hirata Matsumura
Observer/navigator: Takeo Shiro
Radio operator/gunner: Sadamu Murai
Pearl Harbor, 7 December 1941



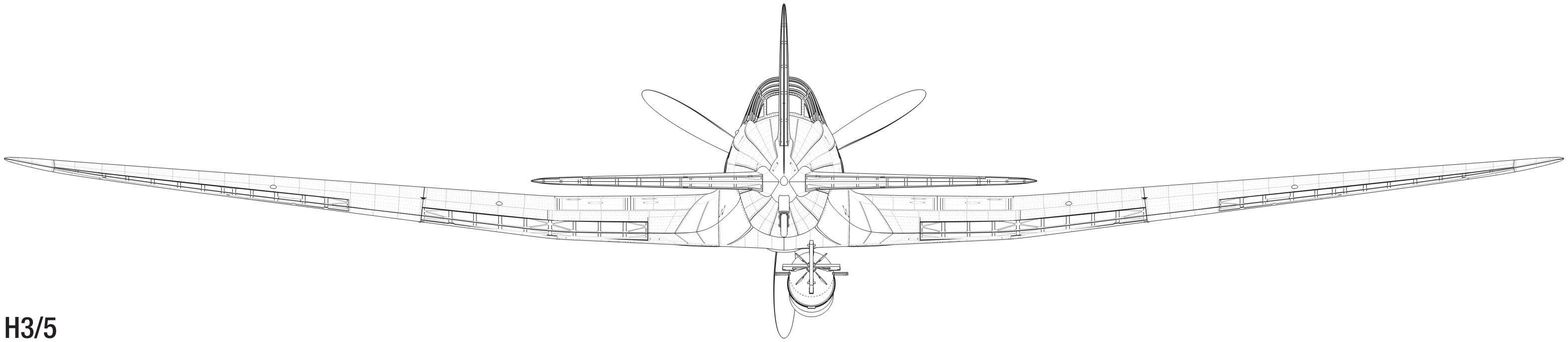
NAKAJIMA TYPE 97 CARRIER ATTACK AIRCRAFT MODEL 12 (1/75 SCALE)

H3/4 FRONT VIEW (ARMED WITH A TYPE 91 MOD. 2 TORPEDO)

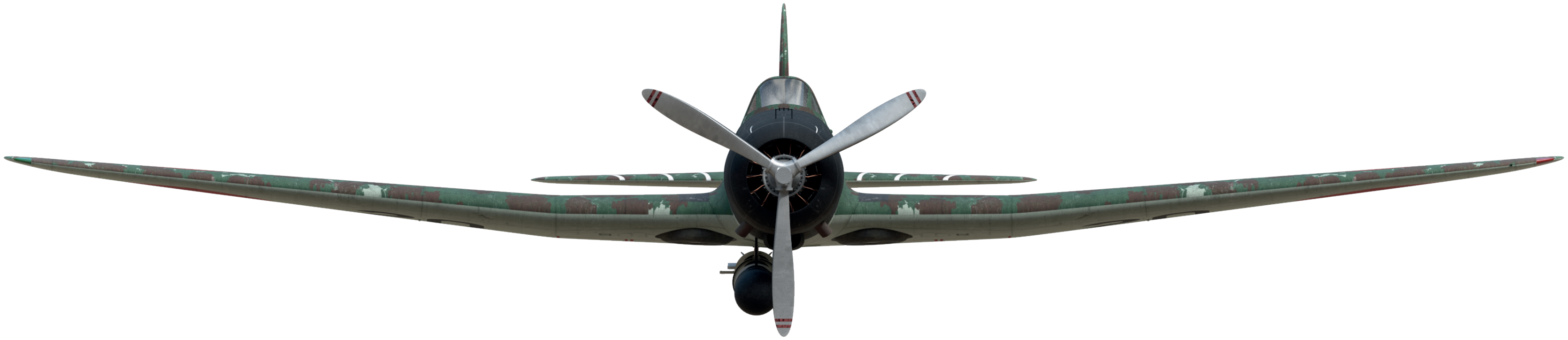
H3/5 BACK VIEW (ARMED WITH A TYPE 91 MOD. 2 TORPEDO)



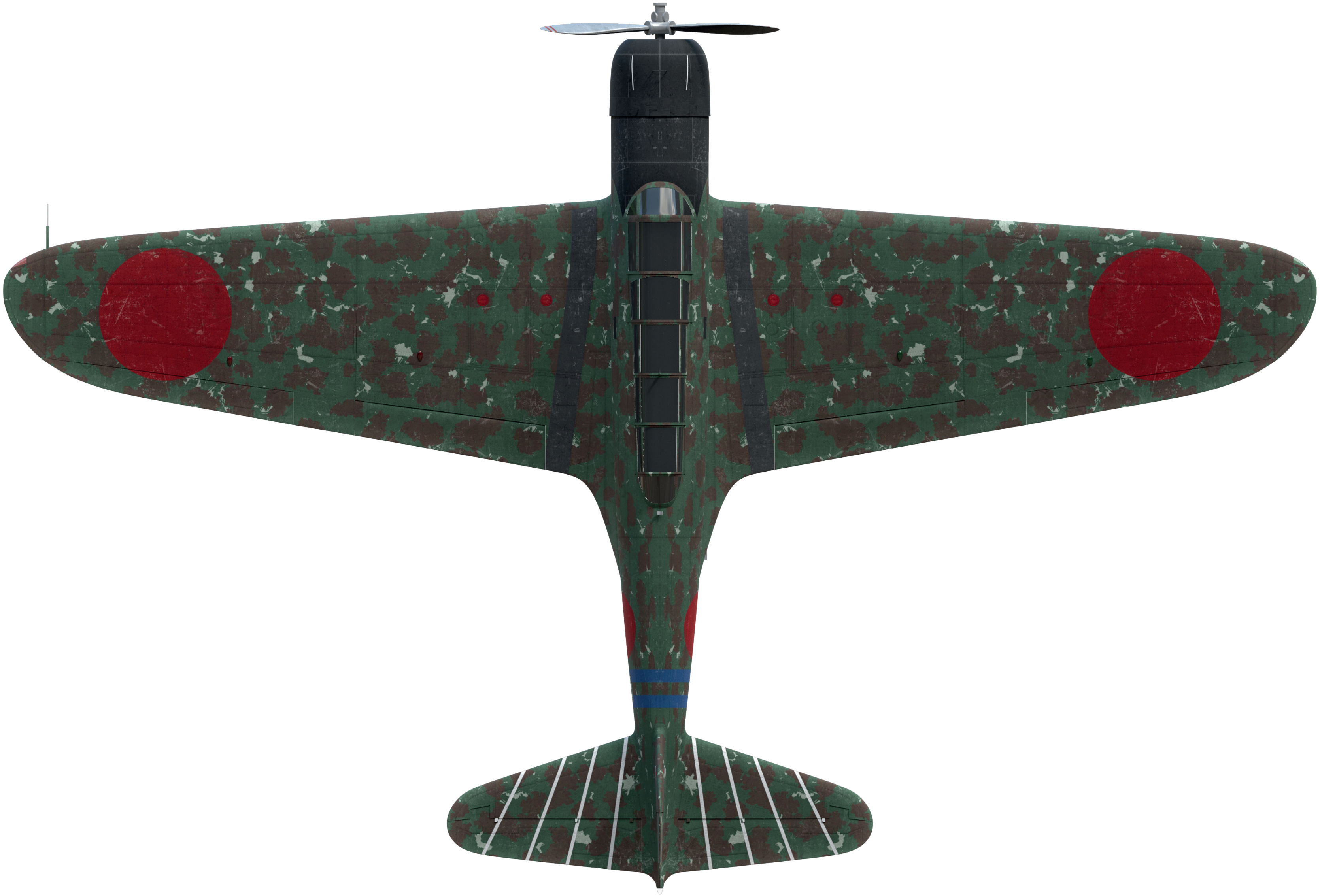
H3/4

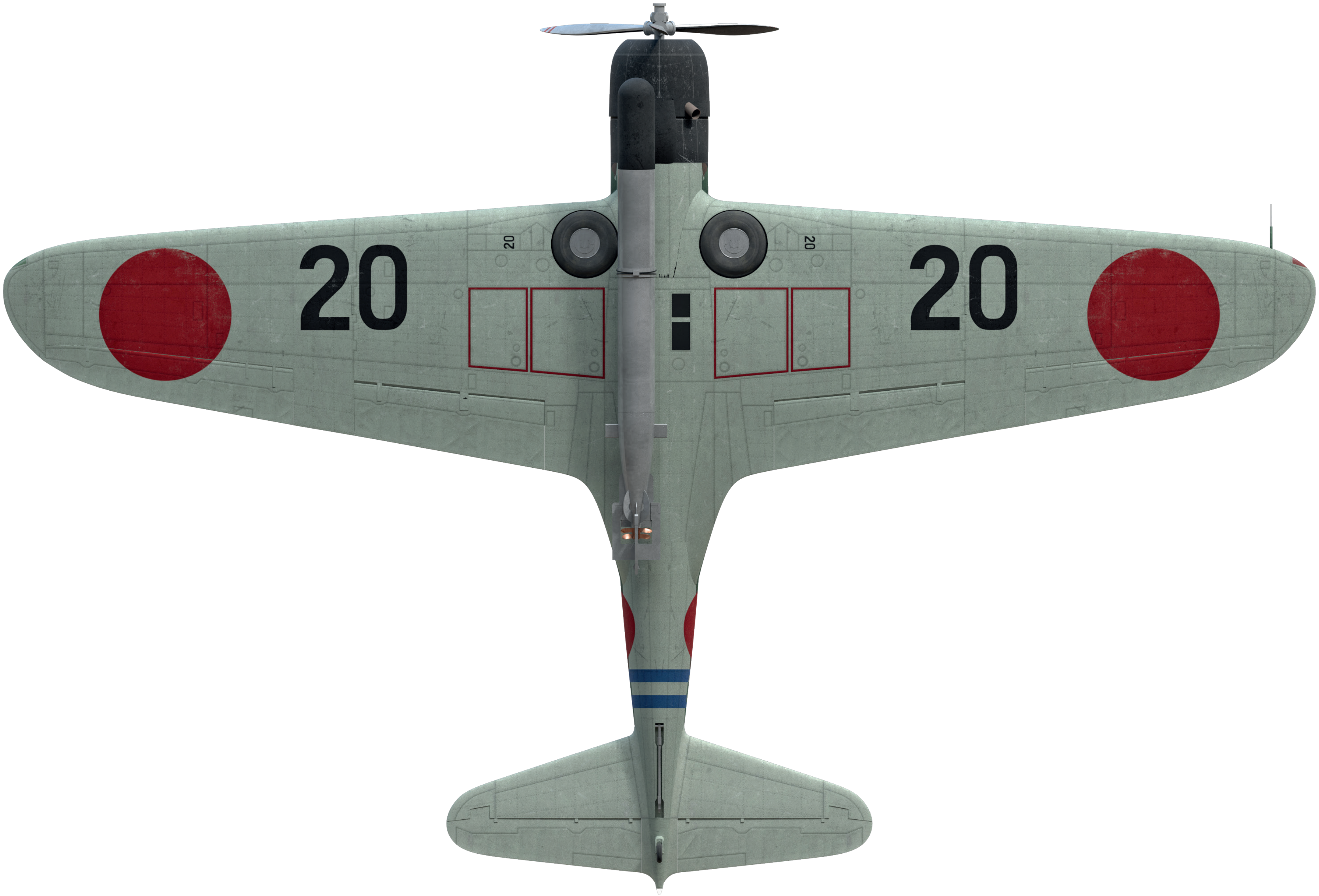


H3/5



BII-320
20

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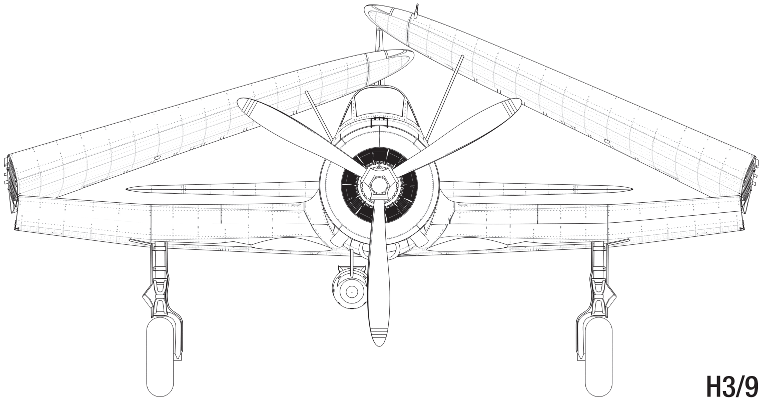
NAKAJIMA TYPE 97 CARRIER ATTACK AIRCRAFT MODEL 12 (1/75 SCALE)

H3/6 PLAN

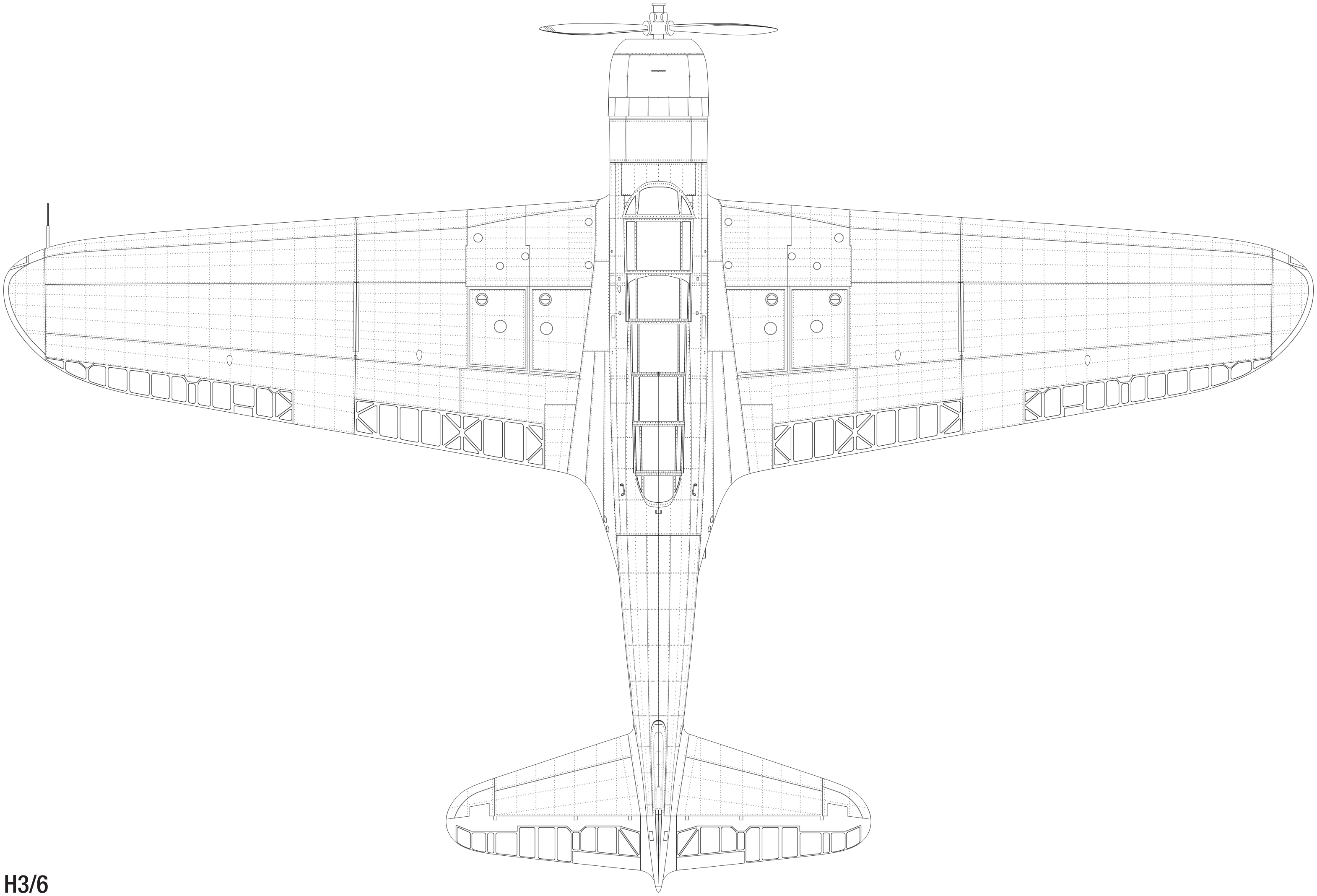
H3/7 BOTTOM VIEW (ARMED WITH A TYPE 91 MOD. 2 TORPEDO)

H3/8 RIGHT PROFILE WITH WINGS FOLDED AND LANDING GEAR LOWERED (ARMED WITH A NO. 80 LAND ATTACK BOMB)

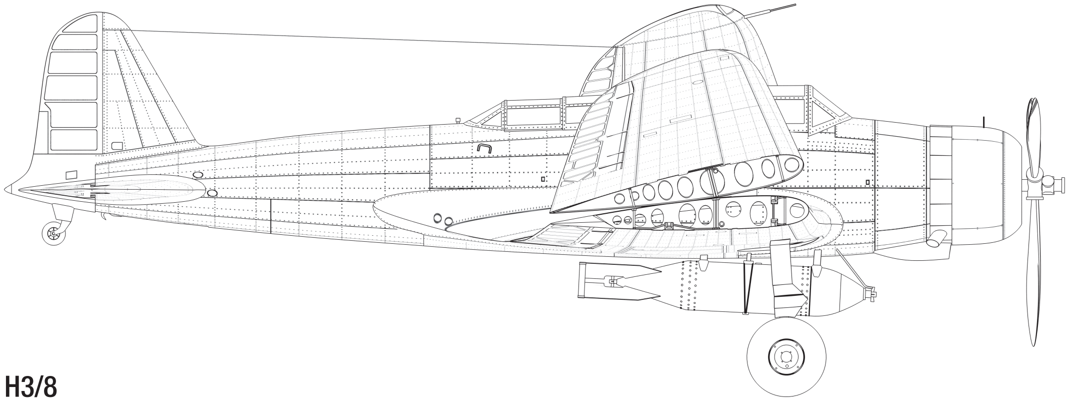
H3/9 FRONT VIEW WITH WINGS FOLDED AND LANDING GEAR LOWERED (ARMED WITH A TYPE 99 NO. 80 ARMOUR PIERCING BOMB)



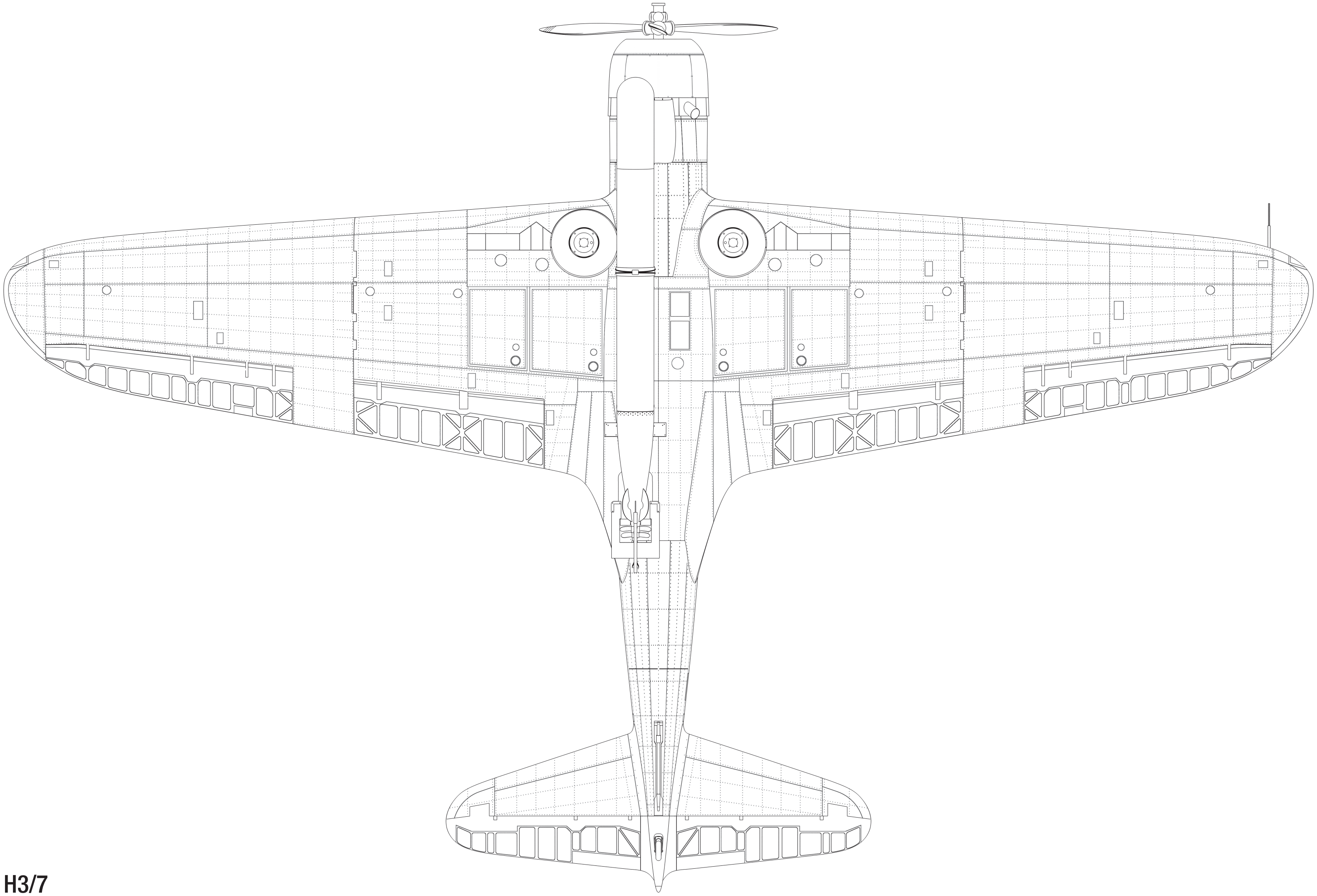
H3/9



H3/6



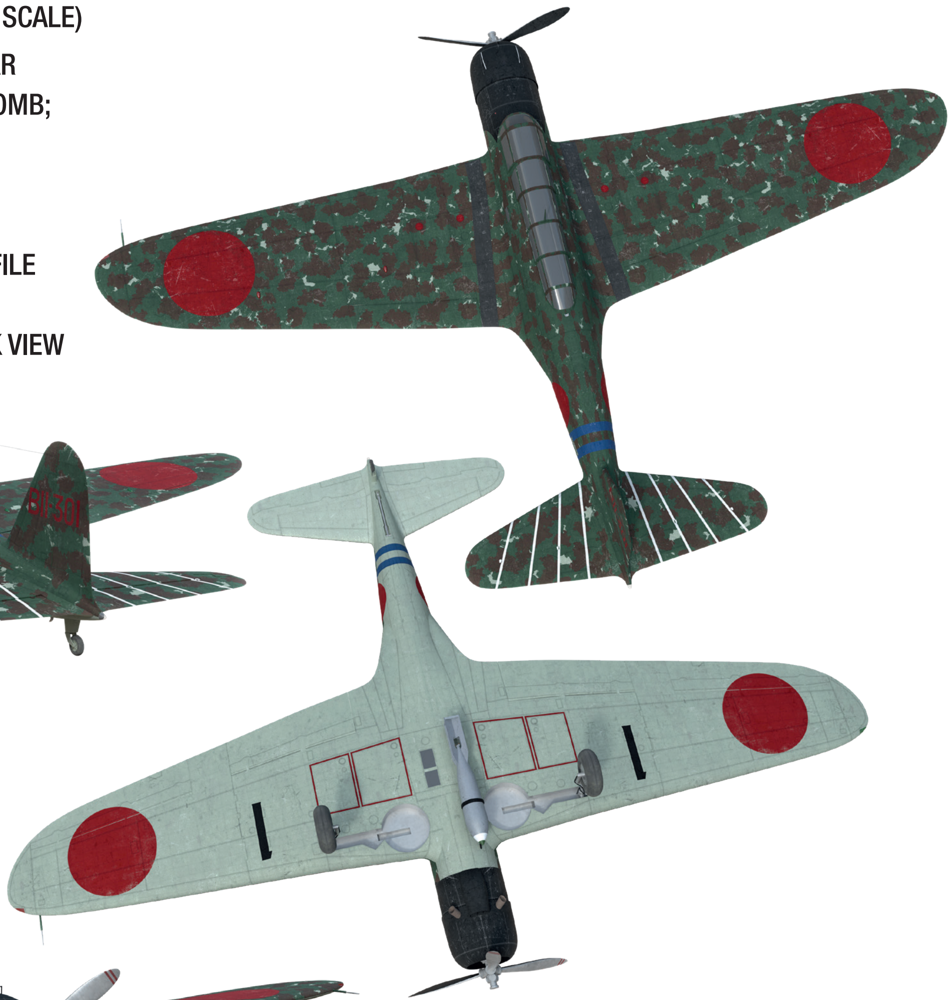
H3/8

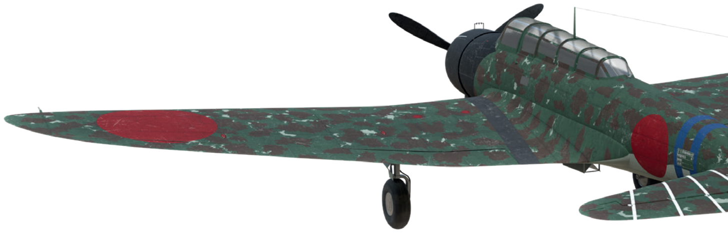


H3/7

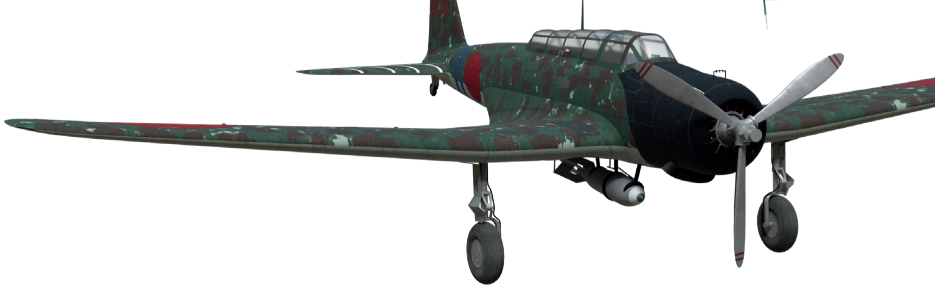
NAKAJIMA TYPE 97 CARRIER ATTACK AIRCRAFT MODEL 12 (1/75 SCALE)

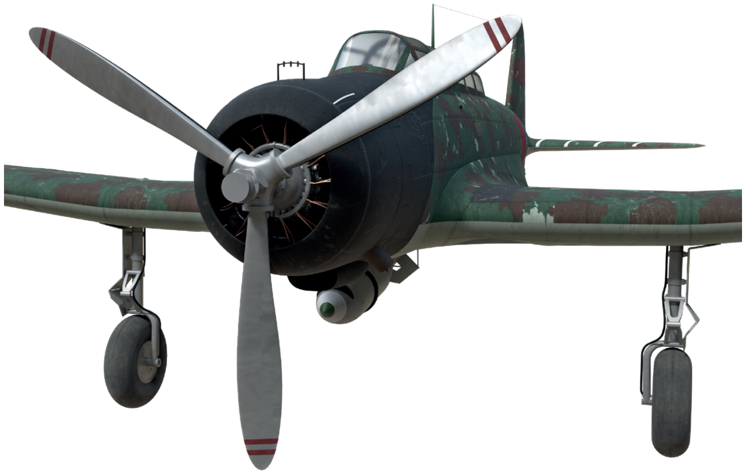
H3/10 BOTTOM VIEW WITH WINGTIPS FOLDED AND LANDING GEAR LOWERED (ARMED WITH A TYPE 99 NO. 80 ARMOUR PIERCING BOMB; FRAGMENT)
H3/11 TYPE 91 MOD. 2 TORPEDO (838KG) – PROFILE, BACK VIEW AND PLAN
H3/12 TYPE 99 NO. 80 ARMOUR PIERCING BOMB (797KG) – PROFILE AND BACK VIEW
H3/13 NO. 80 LAND ATTACK BOMB (805KG) – PROFILE AND BACK VIEW

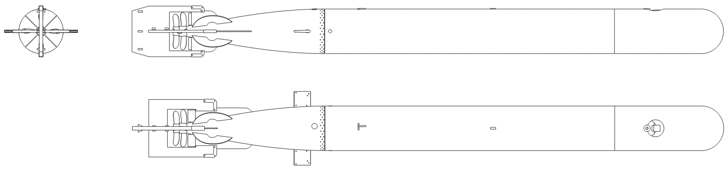




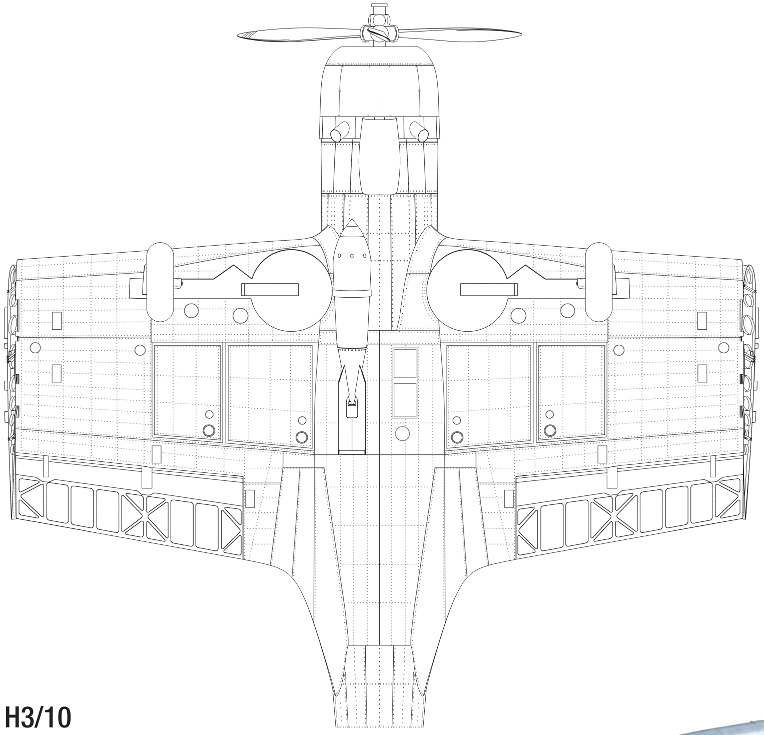
Tailcode: BII-301
Pearl Harbor, 7 December 1941

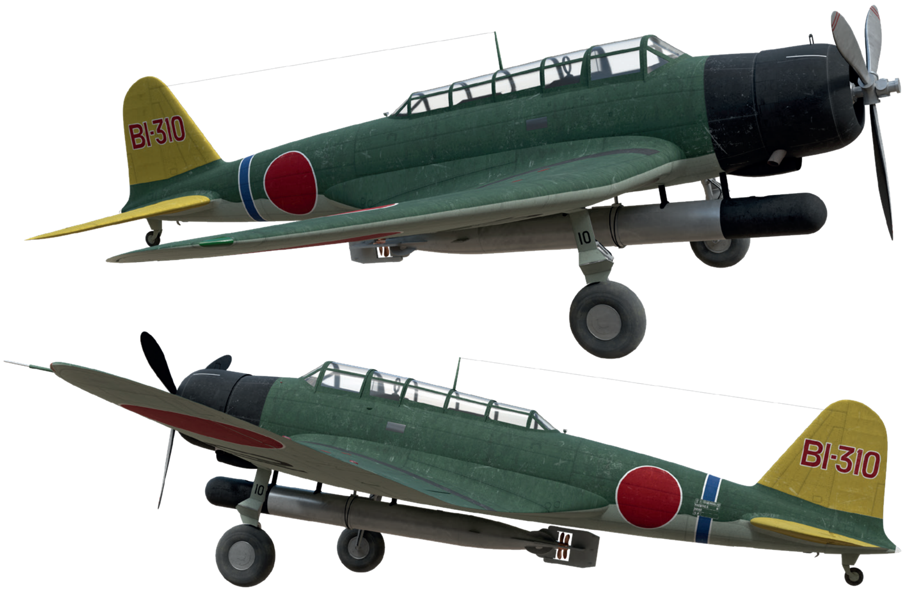




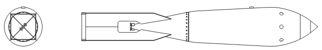


H3/11

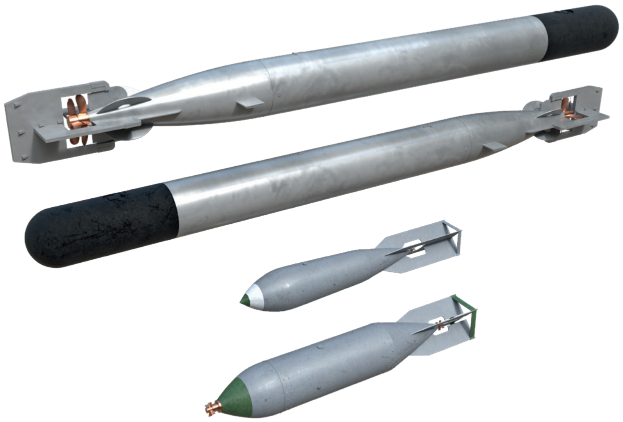


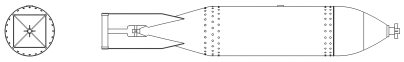


H3/10



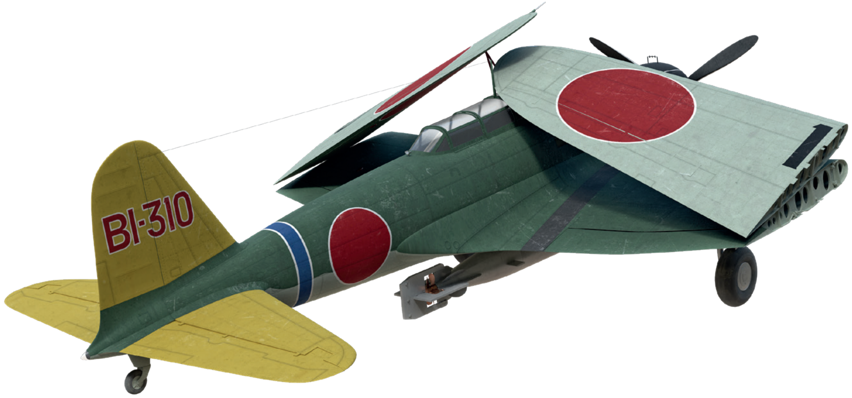
H3/12

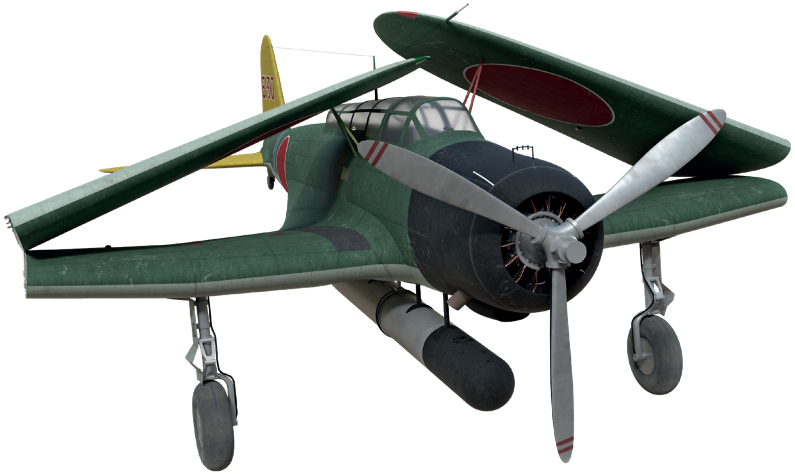




H3/13

Tailcode: BI-310
Pilot: Jōichi Tomonaga
Observer/navigator: Saku Akamatsu
Radio operator/gunner: Sadamu Murai
Midway, 4 June 1942



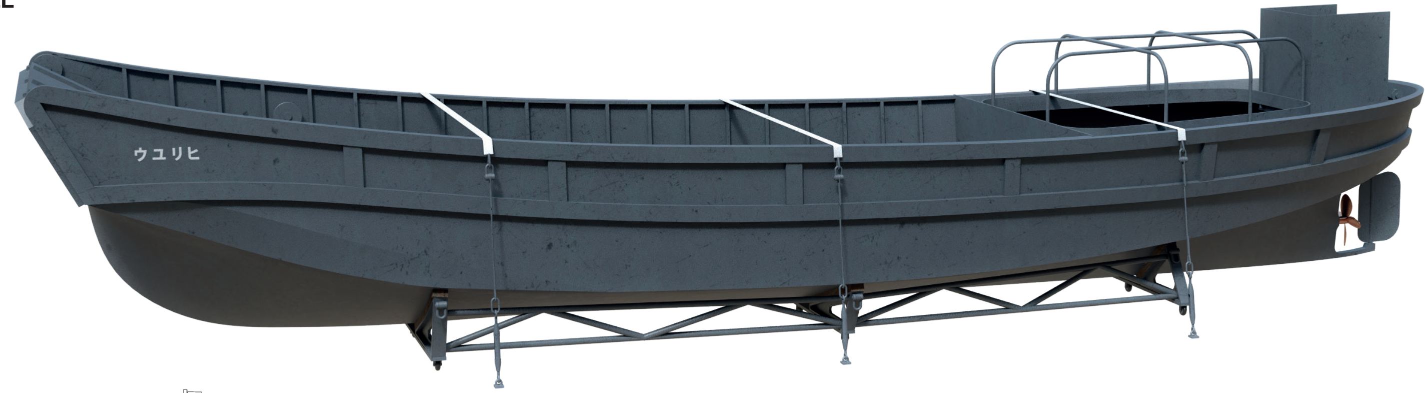


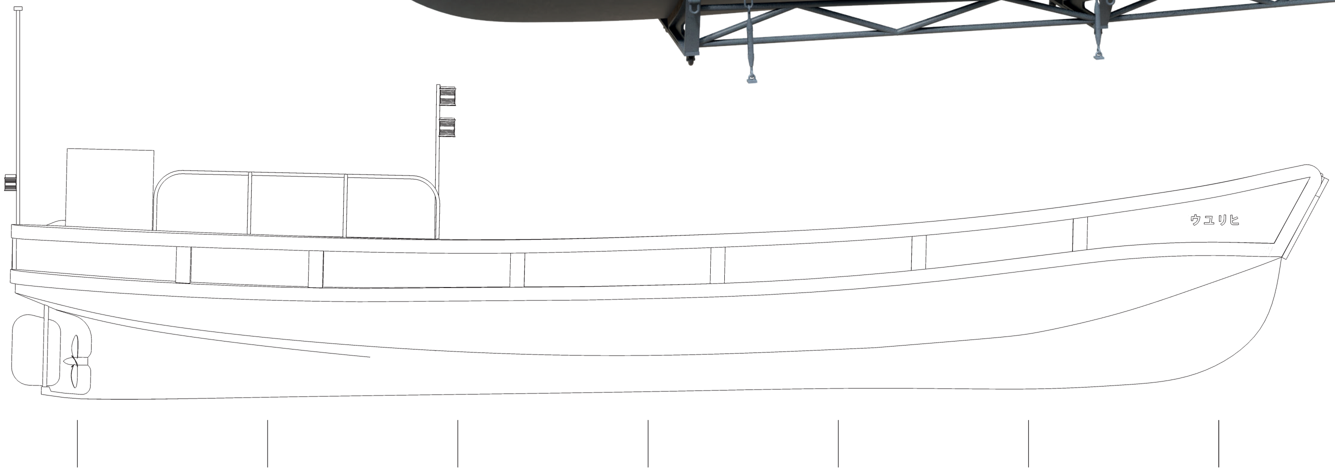
13M SPECIAL TYPE TRANSPORTATION BOAT (1/75 SCALE)

13メートル特型運貨船 – JŪSAN MĒTORU TOKU GATA UNKASEN

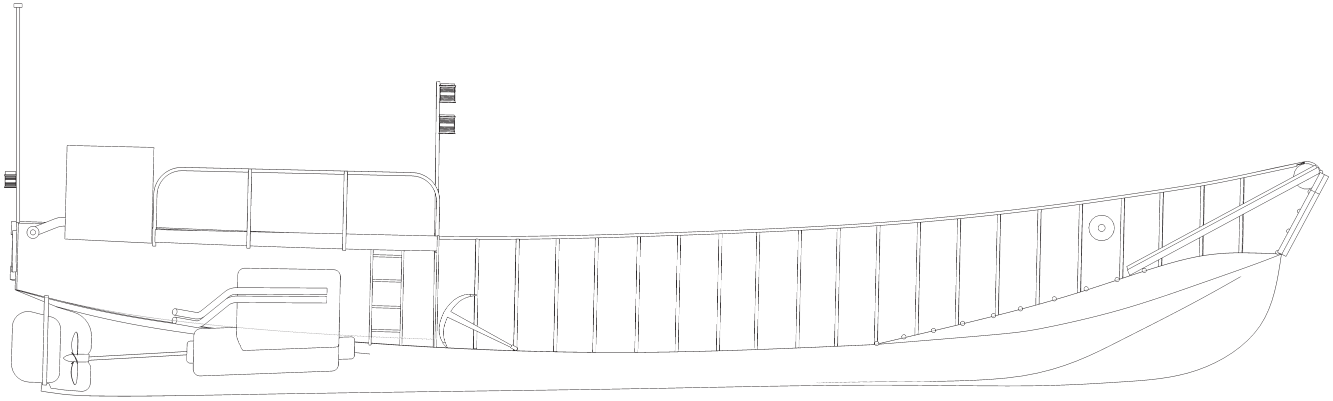
I1/1 PROFILE

I1/2 INTERNAL PROFILE



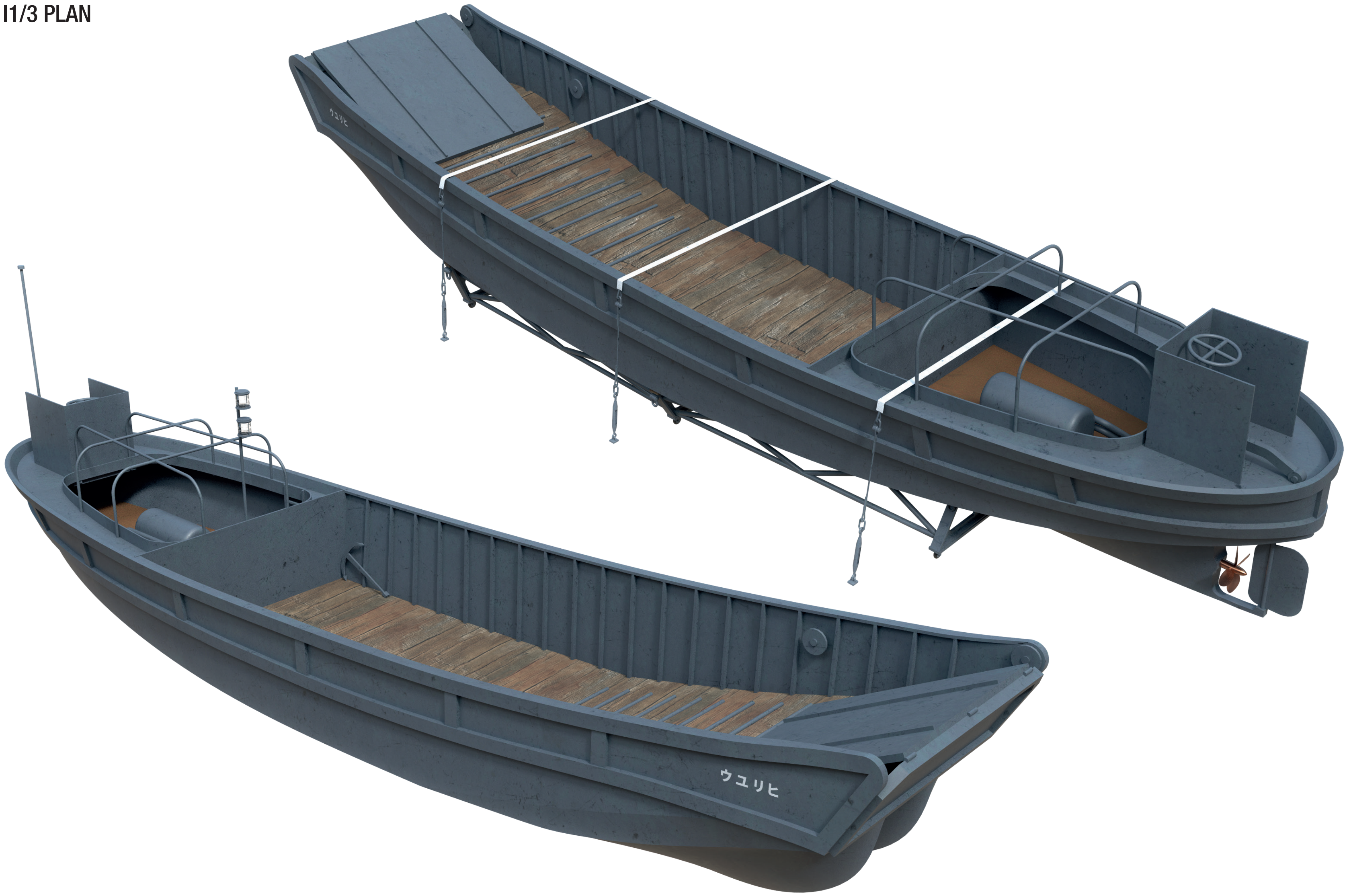


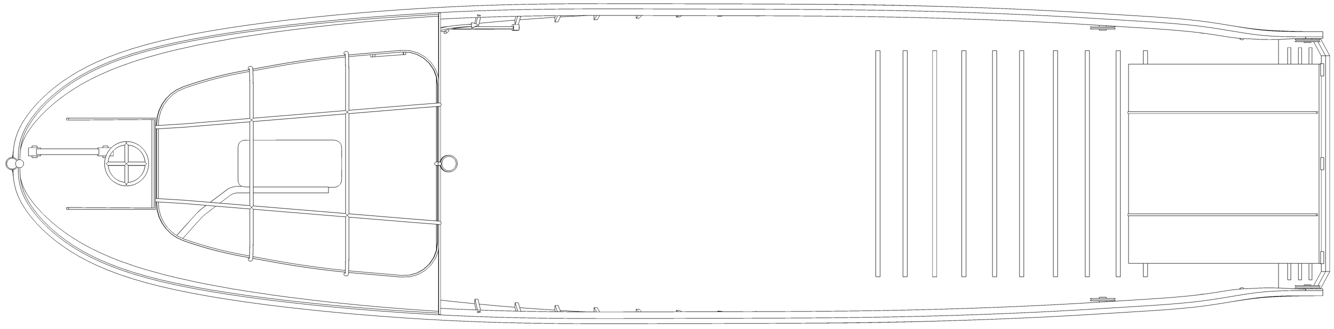
I1/1



I1/2

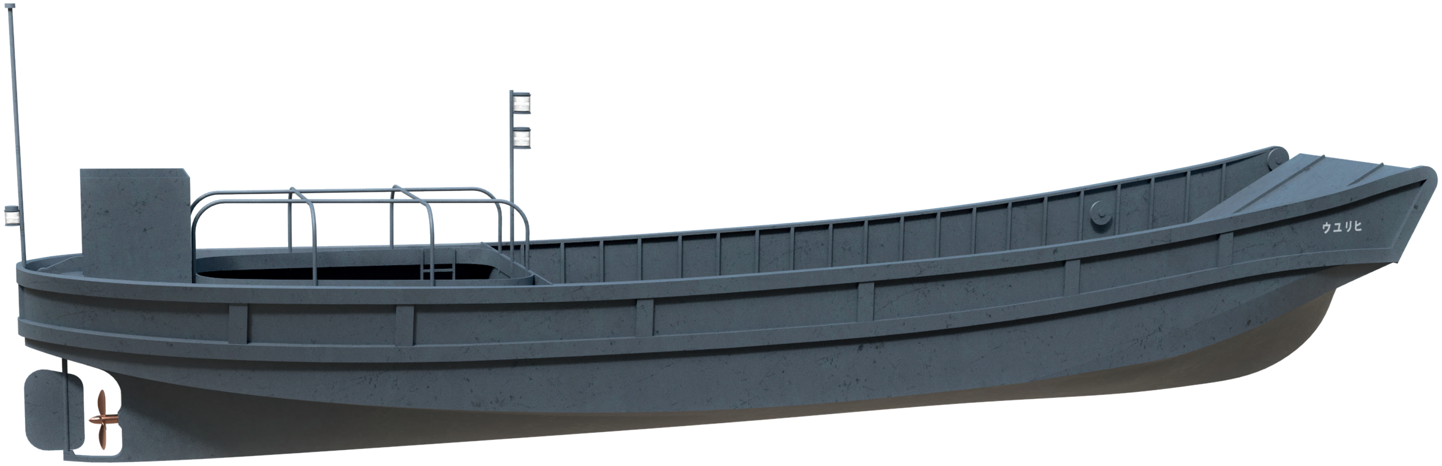
I1/3 PLAN

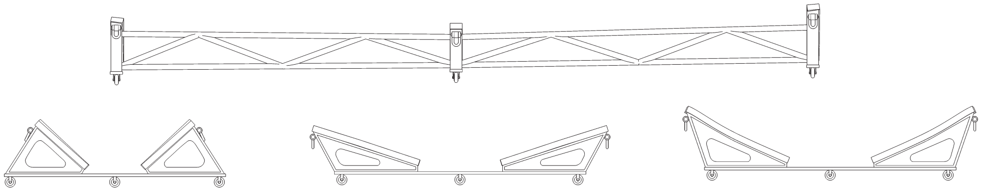




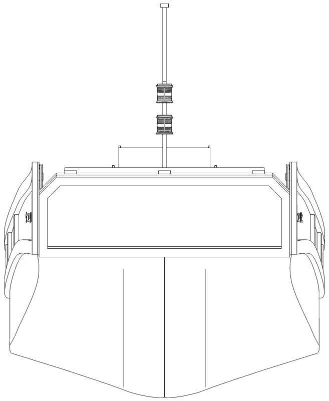
I1/3

I1/4 FRONT VIEW
I1/5 BACK VIEW
I1/6 BODY PLAN
I1/7 BOAT CRADLE – PROFILE AND FRONT VIEW
I1/8 SHIP'S NAME PAINTED IN KATAKANA ON BOATS' BOWS, FROM RIGHT TO LEFT: ヒ-リ-ユ-ウ, HI-RI-YU-U (1/15 SCALE)

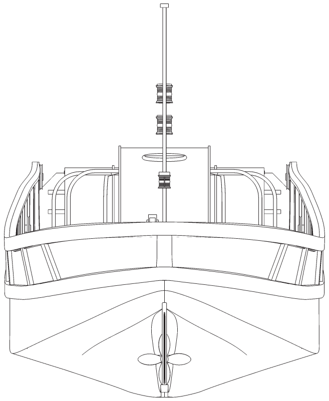




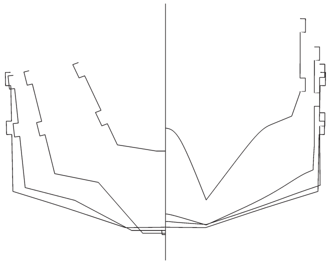
I1/7



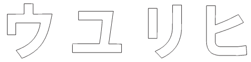
I1/4



I1/5



I1/6

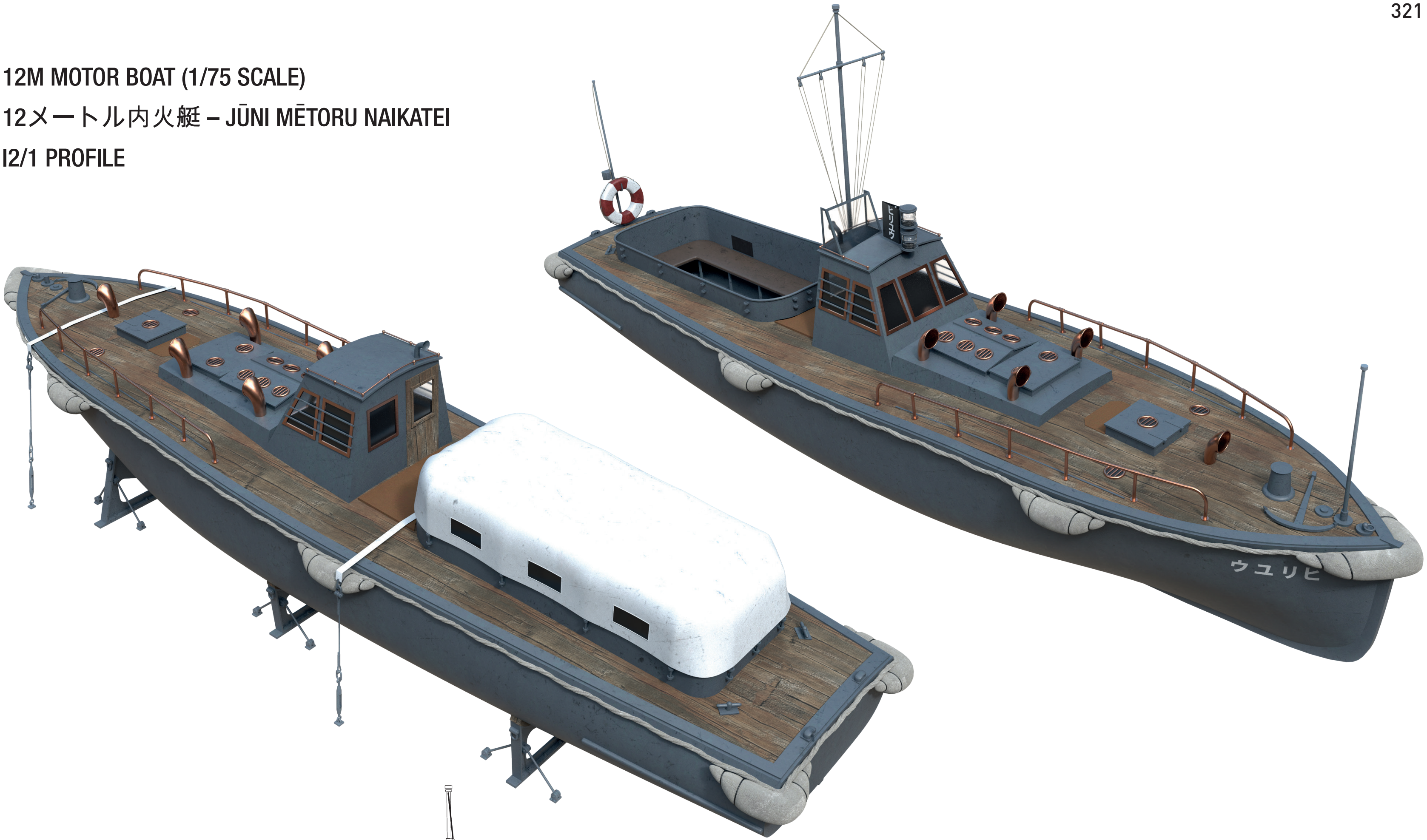


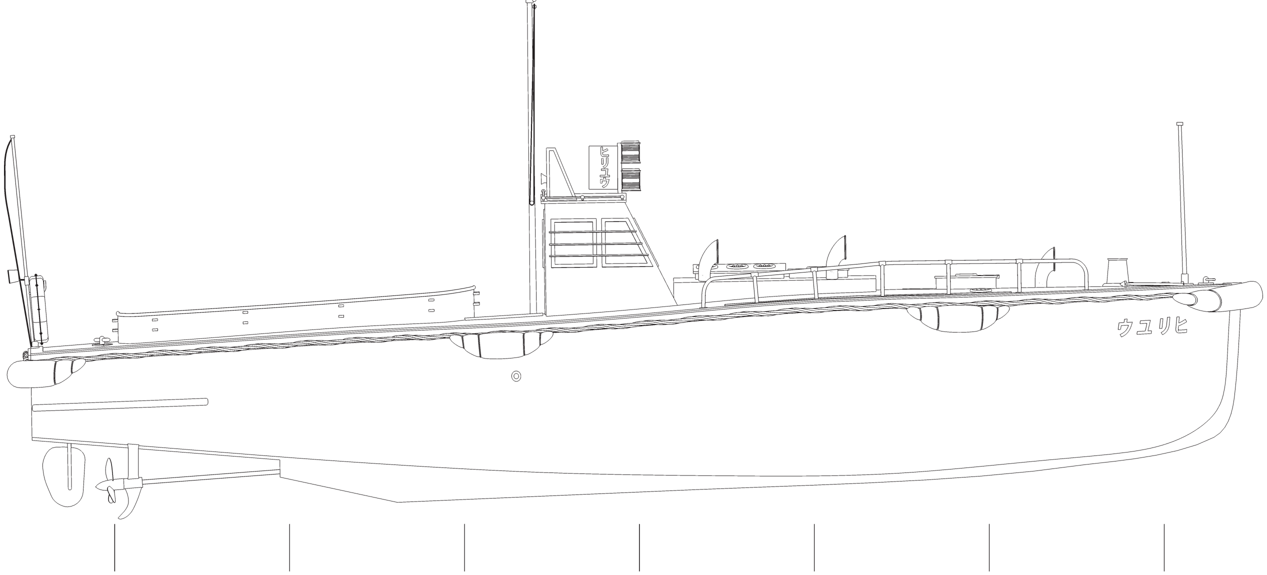
I1/8

12M MOTOR BOAT (1/75 SCALE)

12メートル内火艇 – JŪNI MĒTORU NAIKATEI

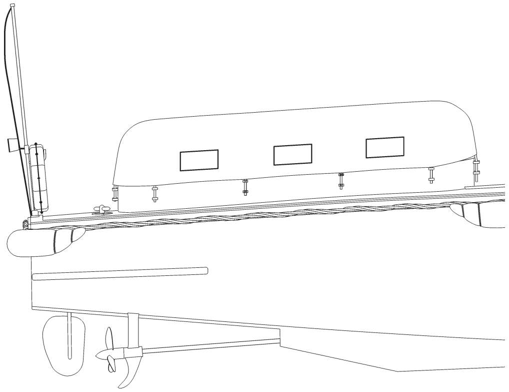
I2/1 PROFILE



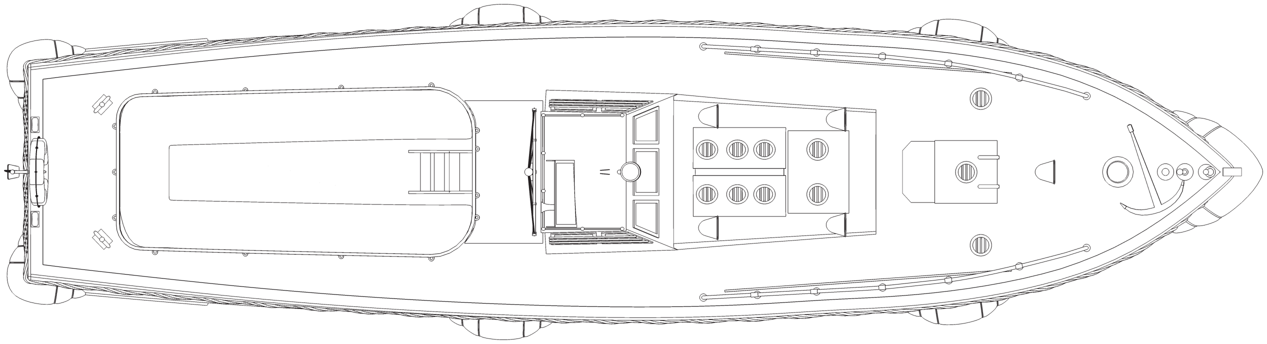


I2/1

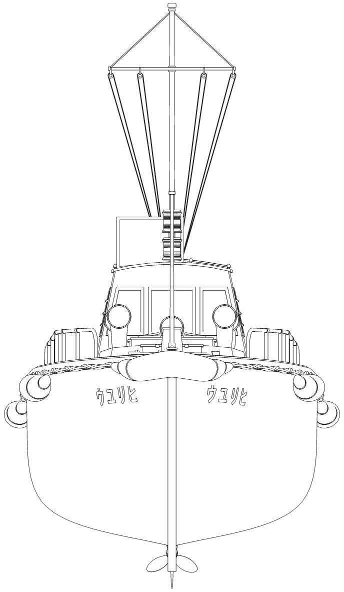
I2/2 PROFILE FRAGMENT WITH CANVAS COVER FITTED
I2/3 PLAN
I2/4 FRONT VIEW
I2/5 BACK VIEW
I2/6 BACK VIEW WITH CANVAS COVER FITTED



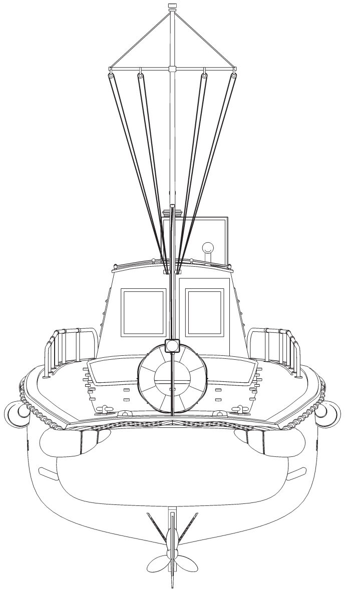
I2/2



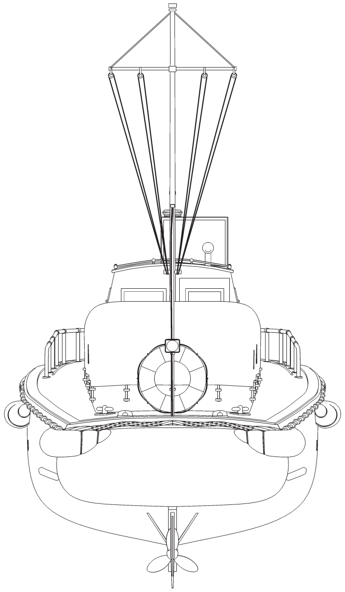
I2/3



I2/4

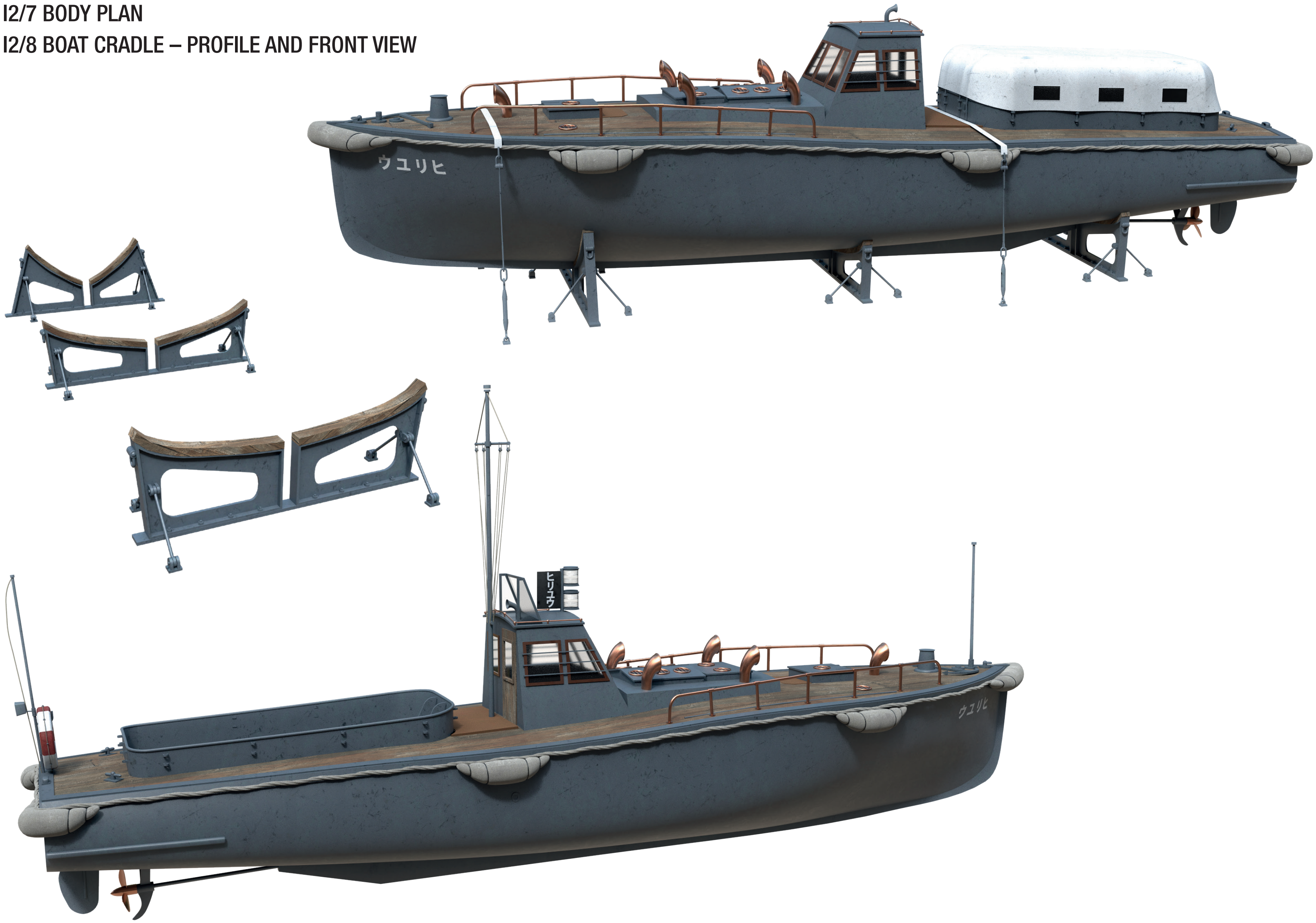


I2/5



I2/6

I2/7 BODY PLAN
I2/8 BOAT CRADLE – PROFILE AND FRONT VIEW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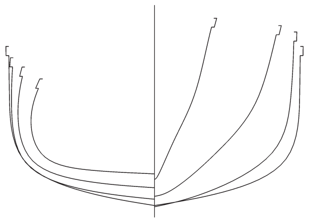
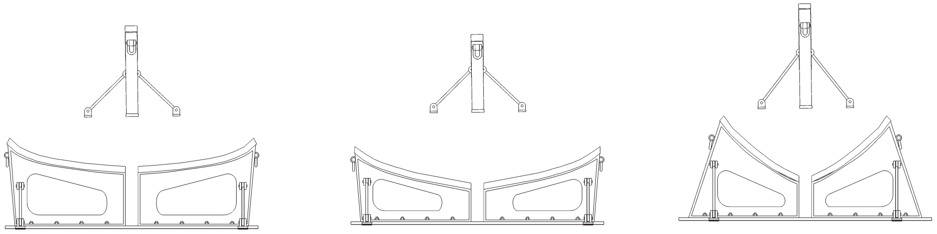
ウユリヒ



I2/7



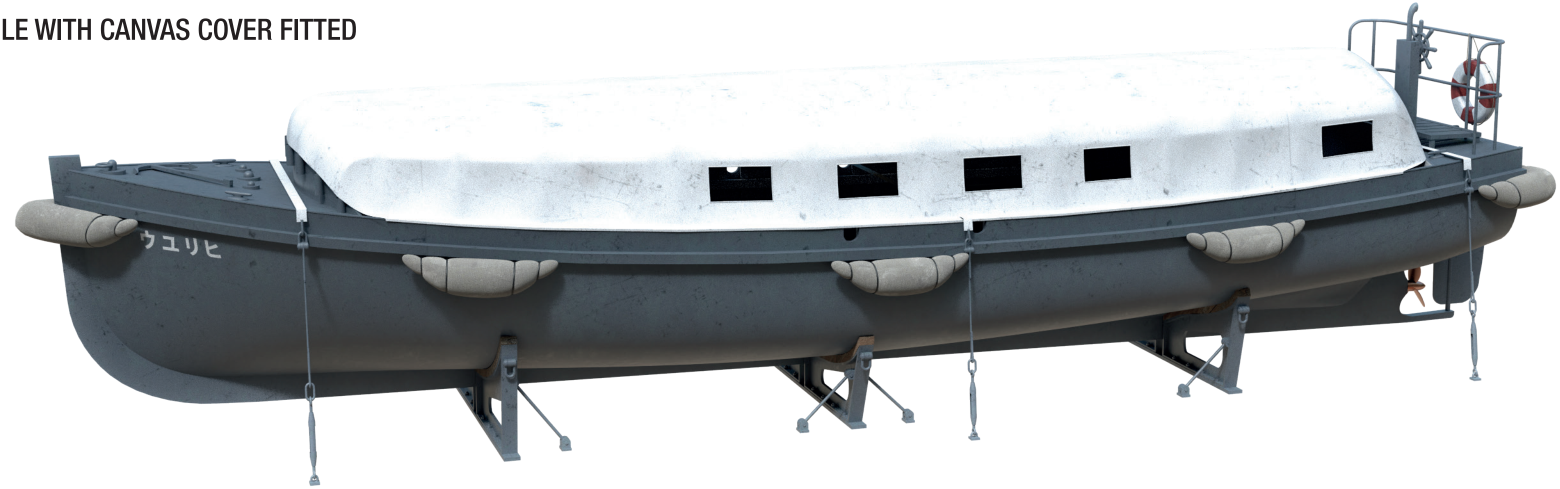
I2/8

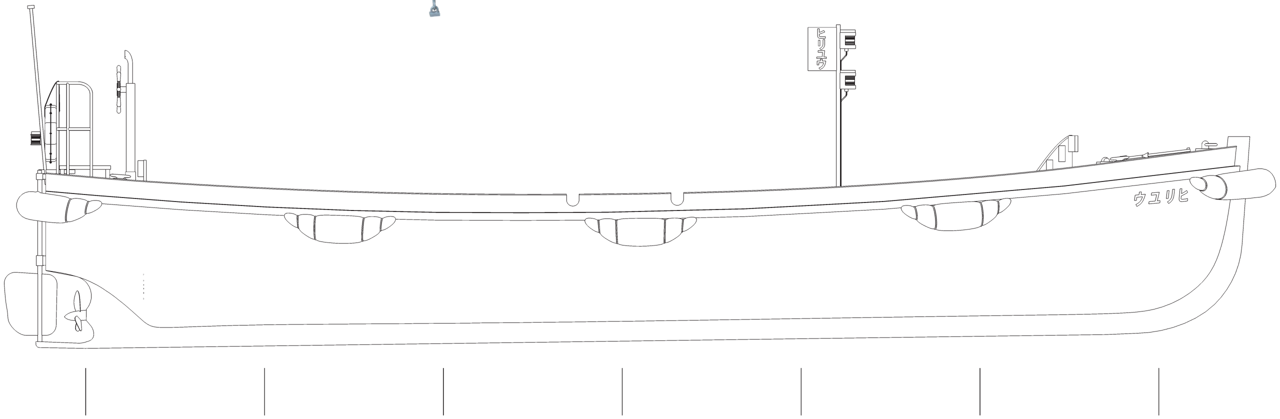
12M MOTOR LAUNCH (1/75 SCALE)

12メートル内火ランチ – JŪNI MĒTORU NAIKA RANCHI

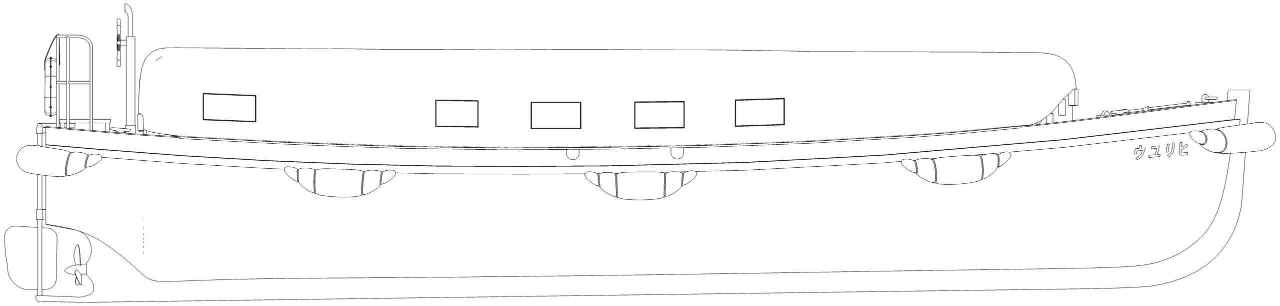
I3/1 PROFILE

I3/2 PROFILE WITH CANVAS COVER FITTED



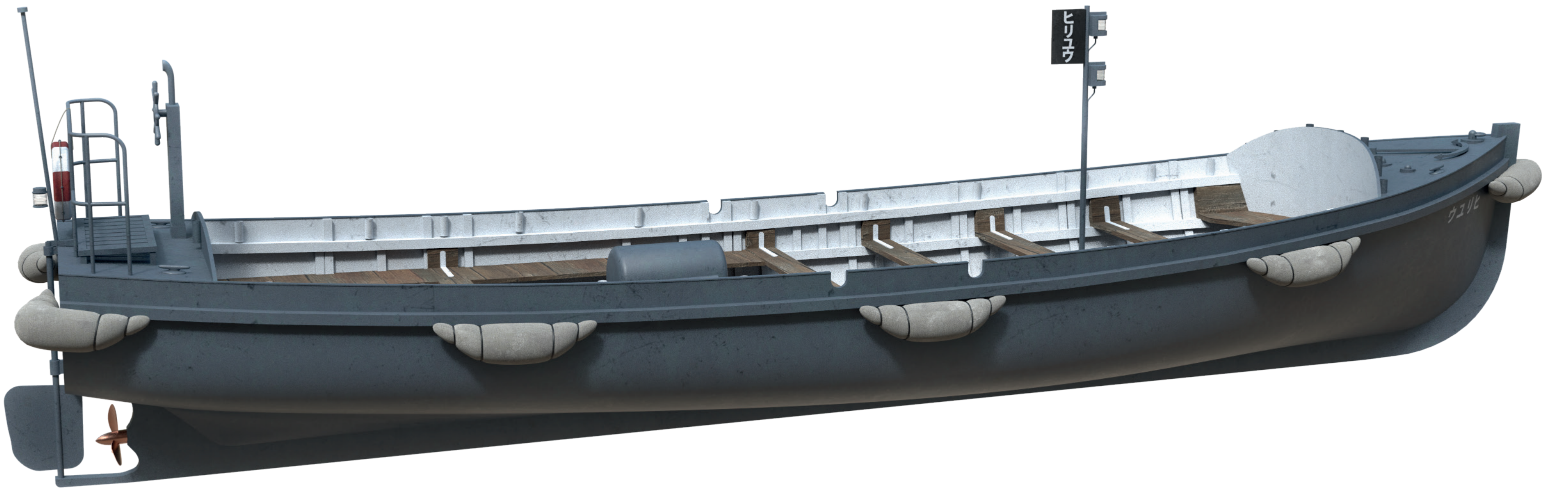


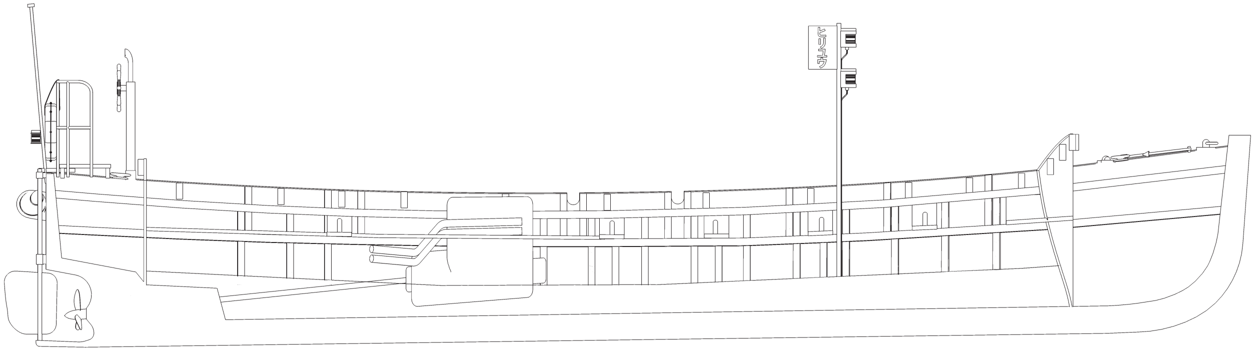
I3/1



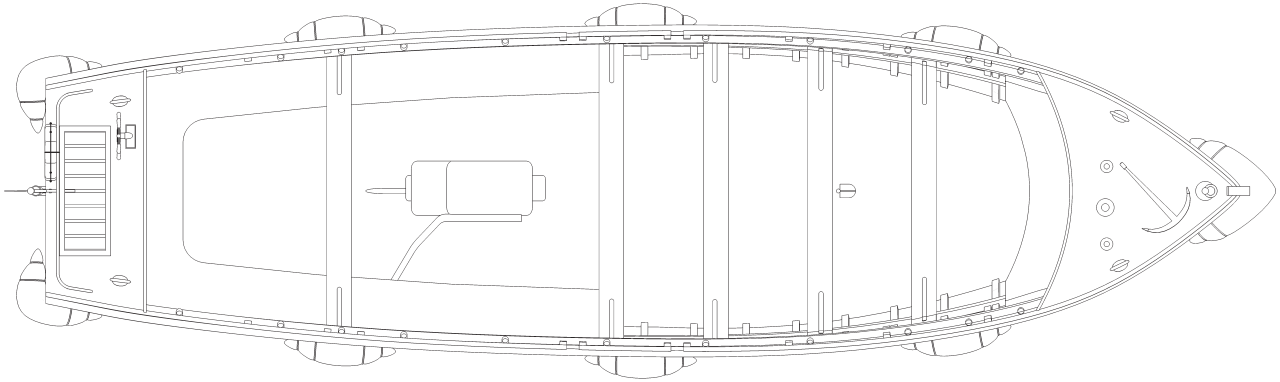
I3/2

I3/3 INTERNAL PROFILE
I3/4 PLAN



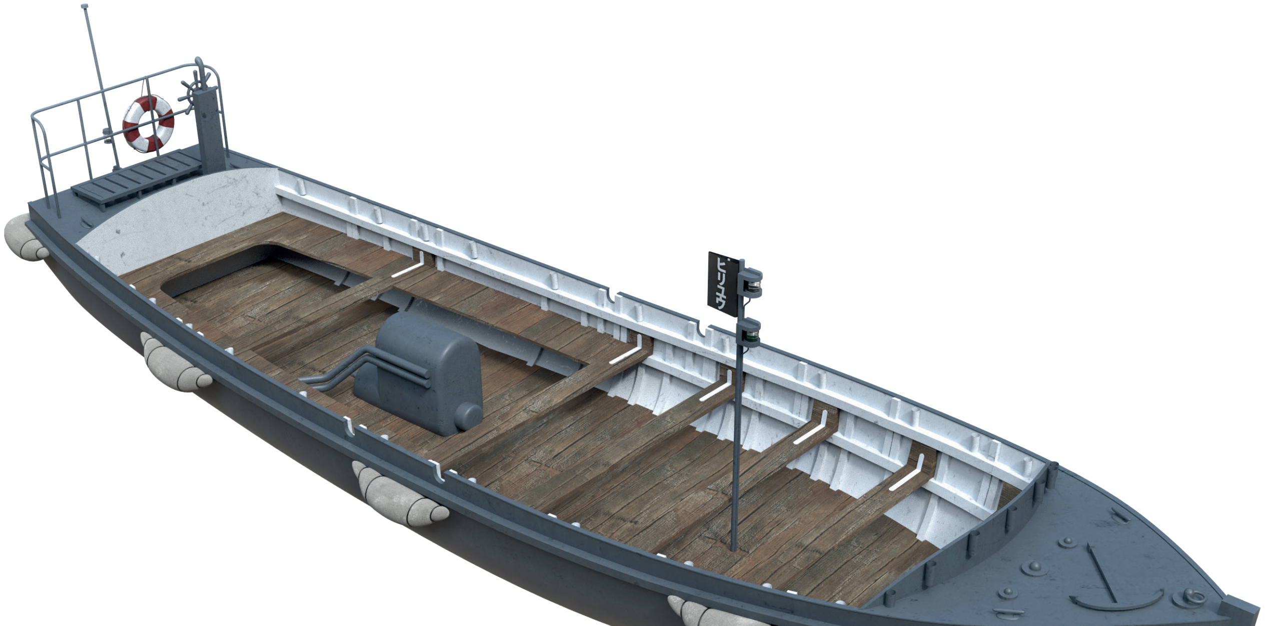


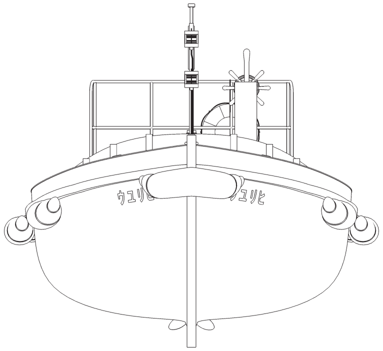
I3/3

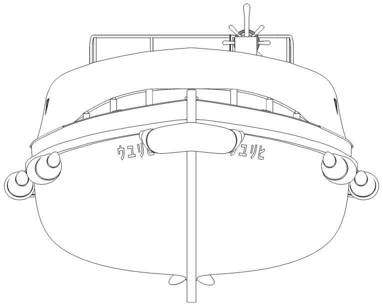


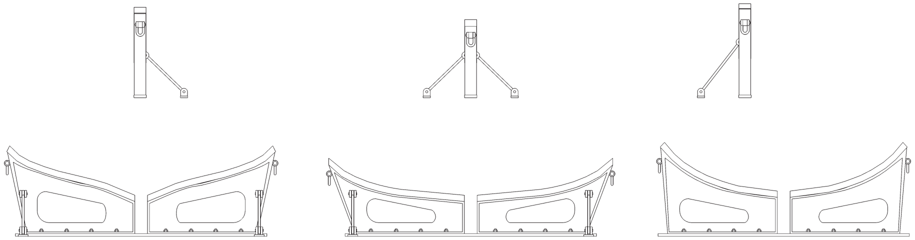
I3/4

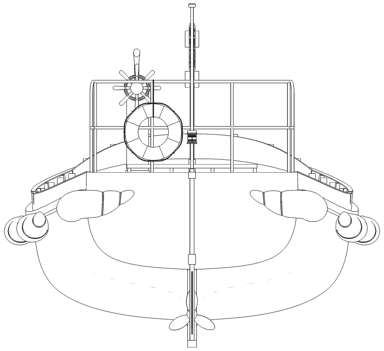
I3/5 FRONT VIEW
I3/6 FRONT VIEW WITH CANVAS COVER FITTED
I3/7 BACK VIEW
I3/8 BODY PLAN
I3/9 BOAT CRADLE – PROFILE AND FRONT VIEW

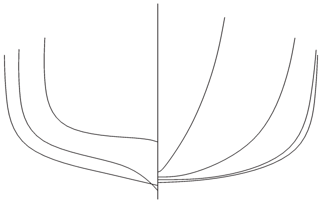



I3/5


I3/6


I3/9


I3/7

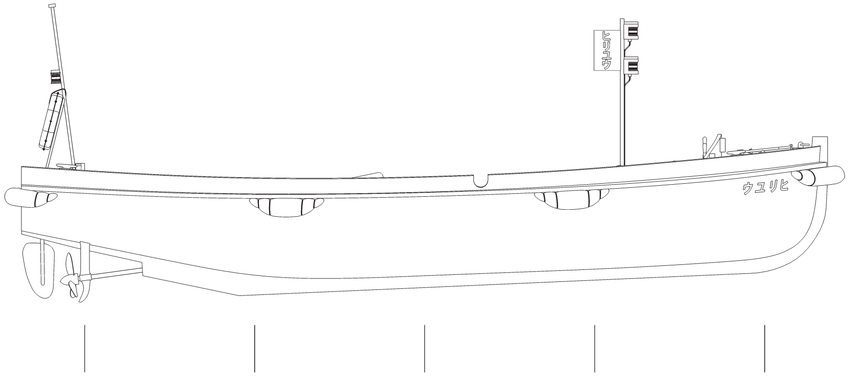

I3/8

8M MOTOR LAUNCH (1/75 SCALE)

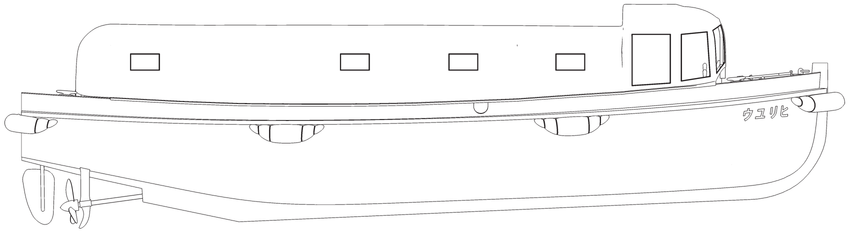
8メートル内火ランチ – HACHI MĒTORU NAIKA RANCHI

I4/1 PROFILE

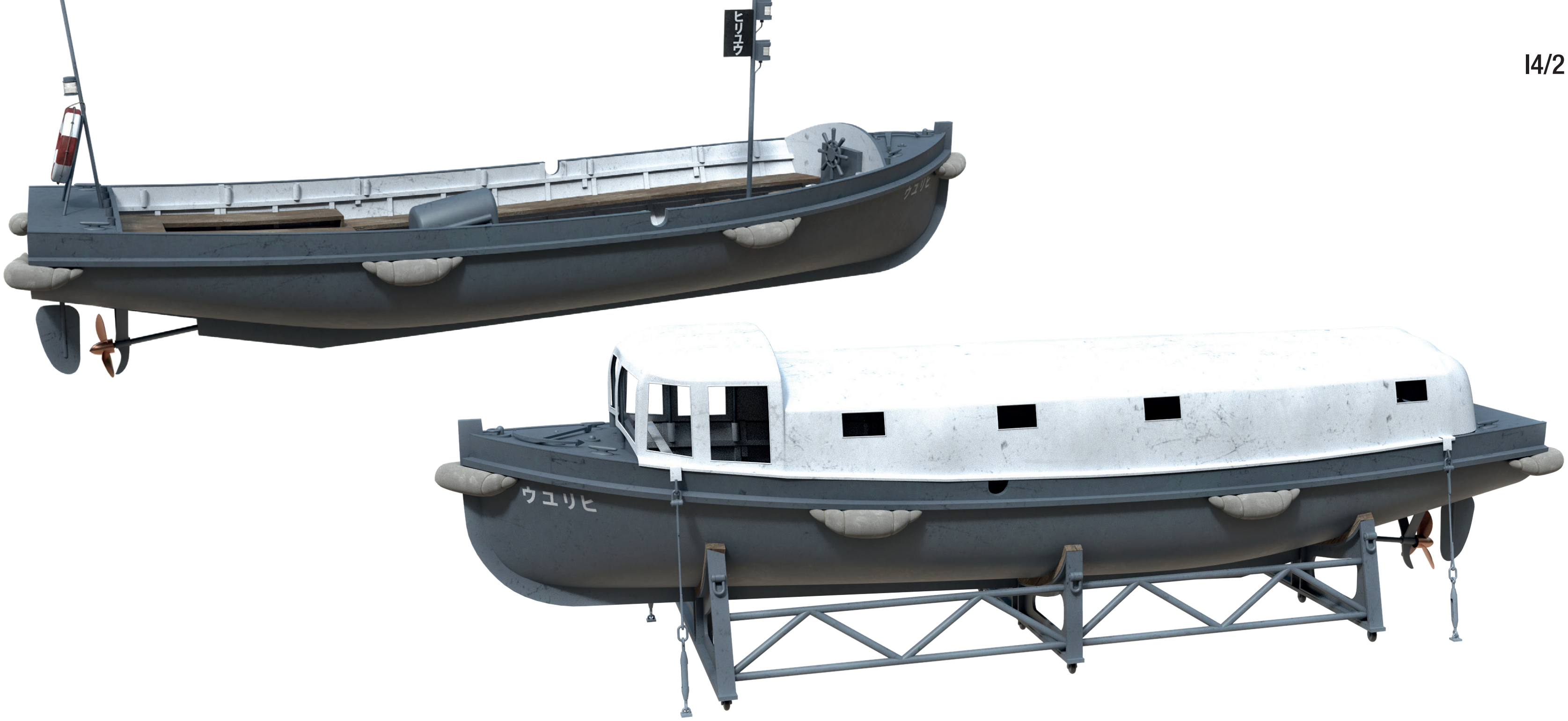
I4/2 PROFILE WITH CANVAS COVER FITTED



I4/1



I4/2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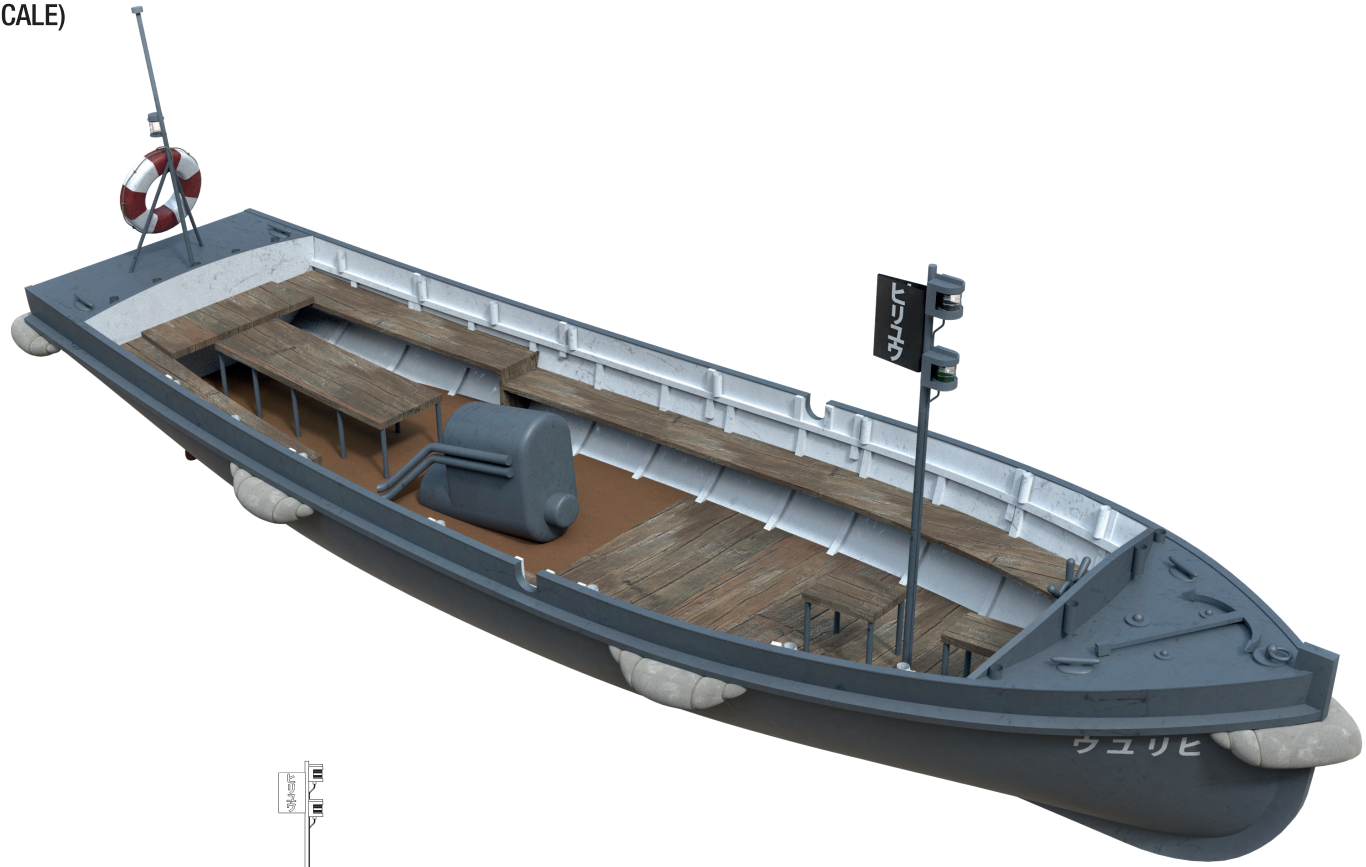
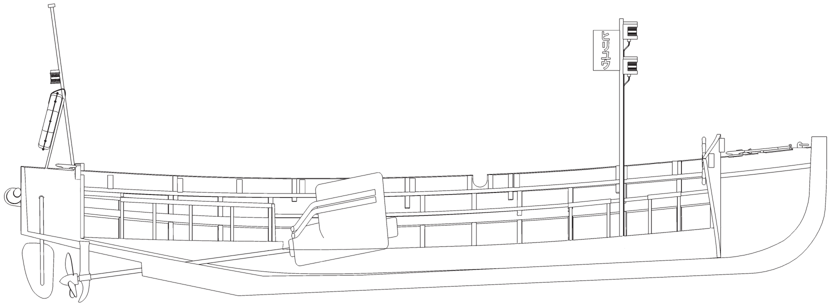
8M MOTOR LAUNCH (1/75 SCALE)

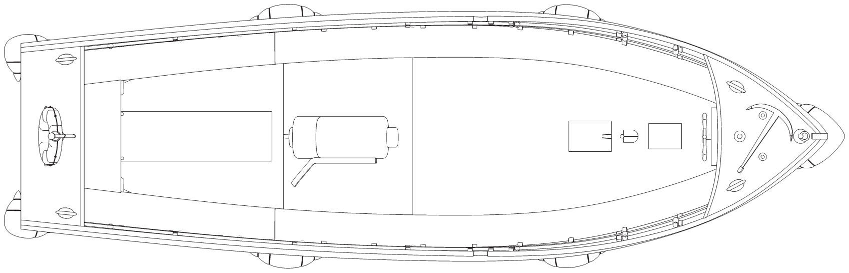
I4/3 INTERNAL PROFILE

I4/4 PLAN

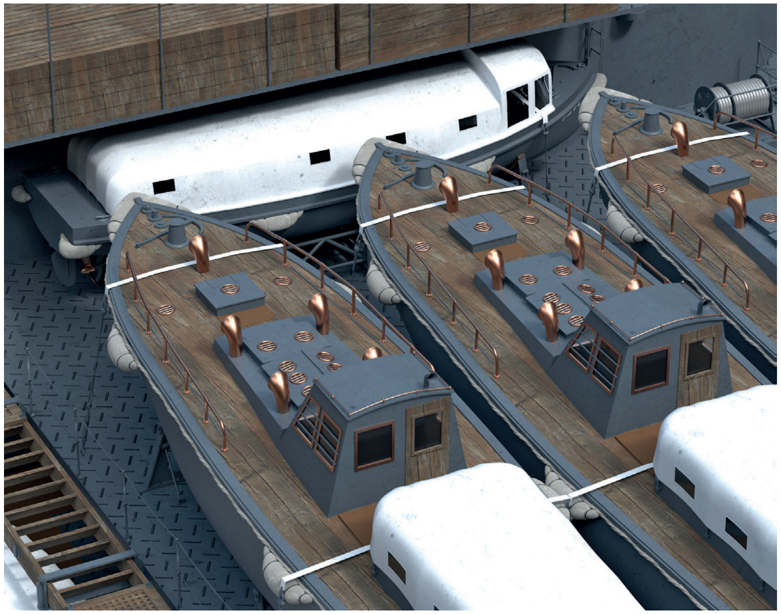




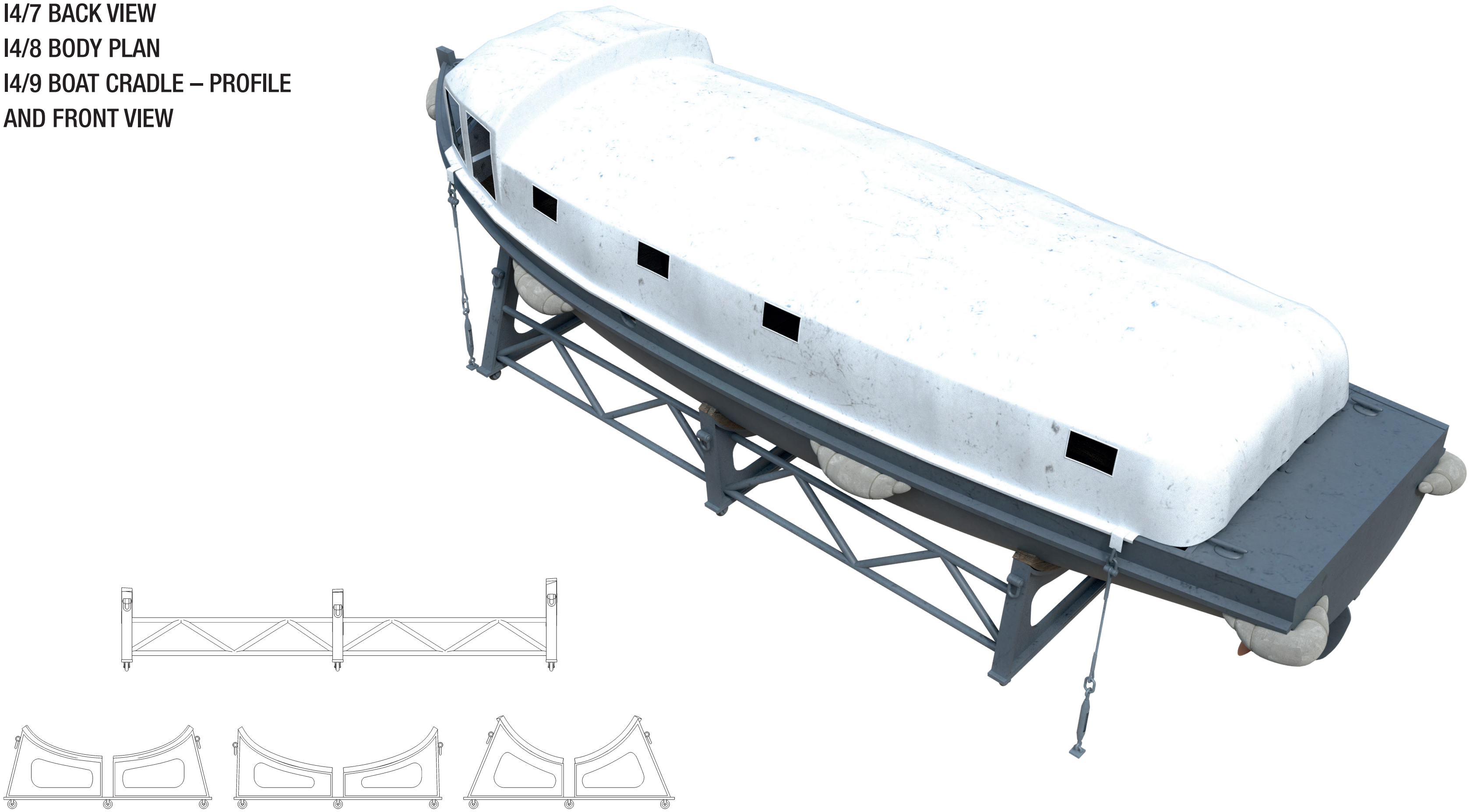
I4/3



I4/4



I4/5 FRONT VIEW
I4/6 FRONT VIEW WITH CANVAS COVER FITTED
I4/7 BACK VIEW
I4/8 BODY PLAN
I4/9 BOAT CRADLE – PROFILE
AND FRONT VIEW



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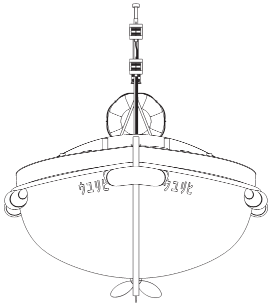

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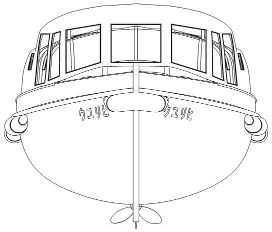

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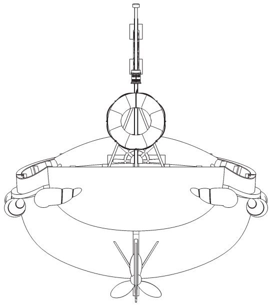

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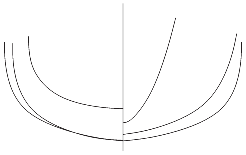


I4/8

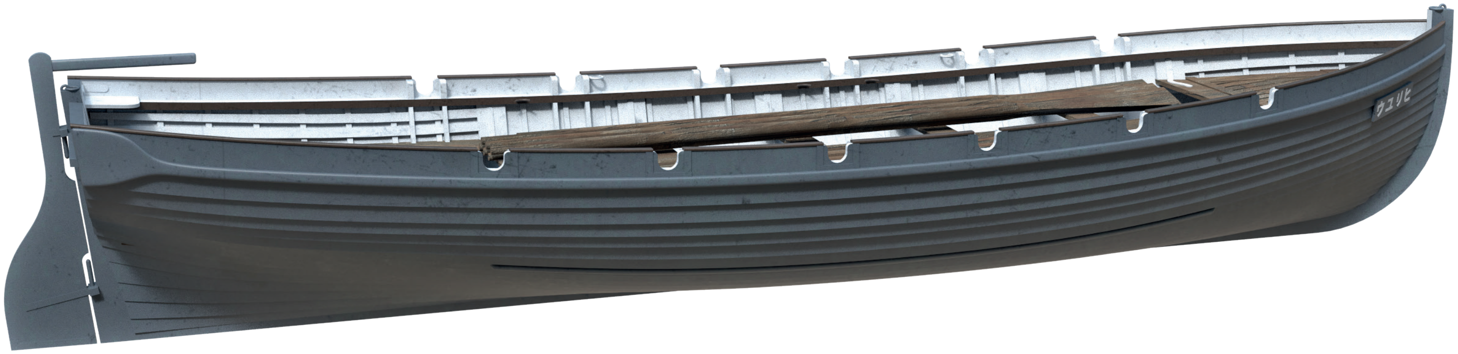
9M ROW CUTTER (1/75 SCALE)

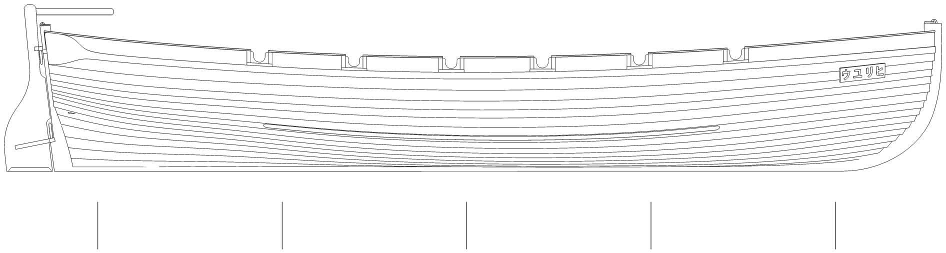
9メートルカッター – KYŪ MĒTORU KATTĀ

I5/1 PROFILE

I5/2 INTERNAL PROFILE

I5/3 PLAN





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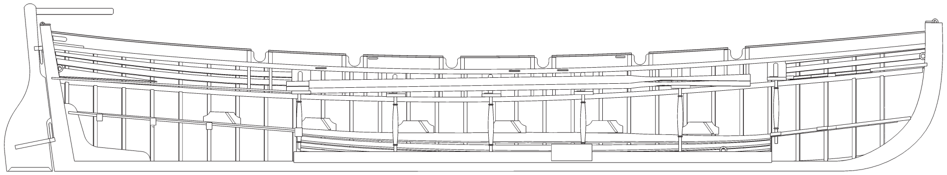
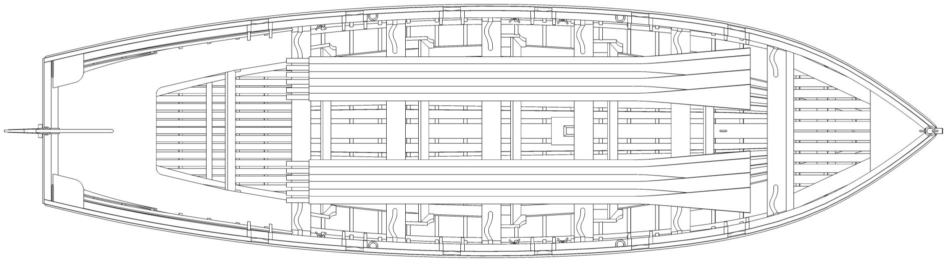
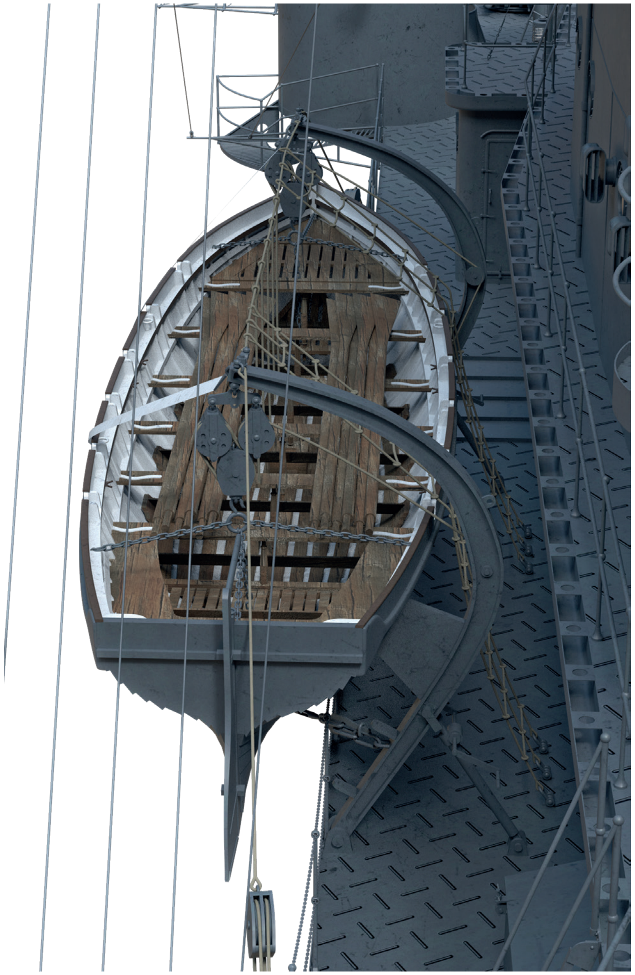


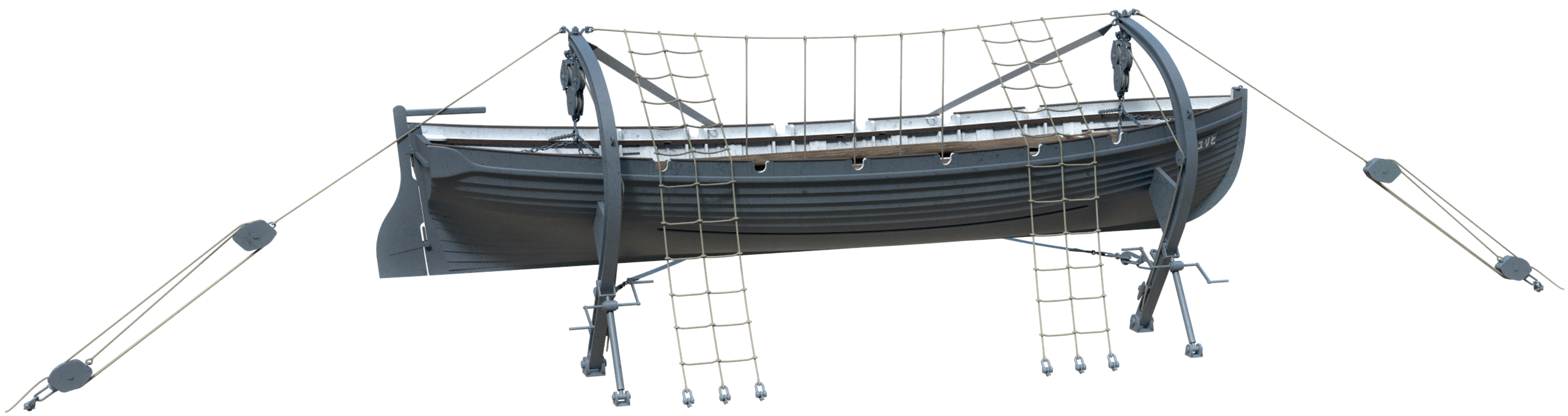
I5/2

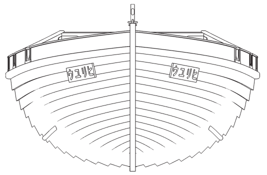


I5/3



I5/4 FRONT VIEW
I5/5 BACK VIEW
I5/6 BODY PLAN
I5/7 RIGGED CUTTER DAVITS – PROFILE





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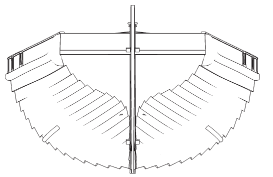

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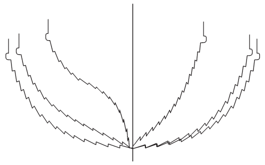

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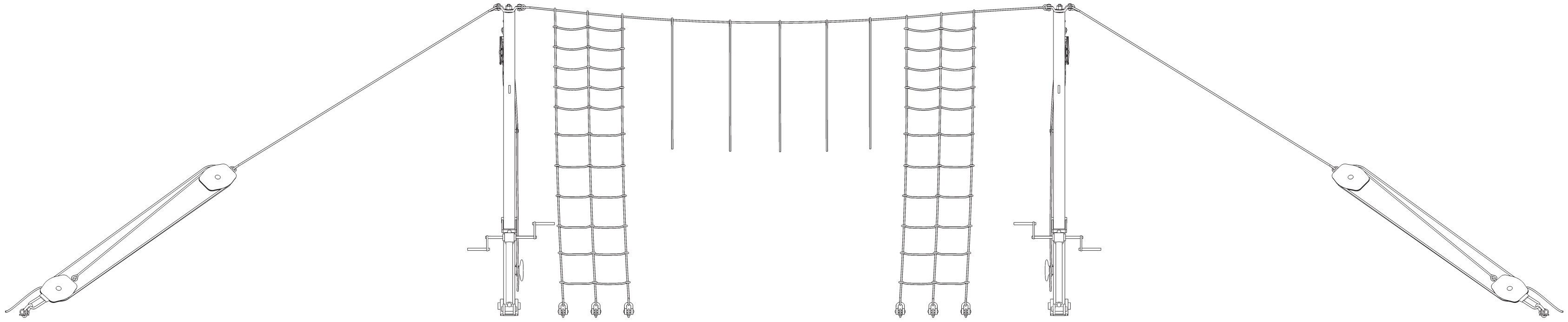
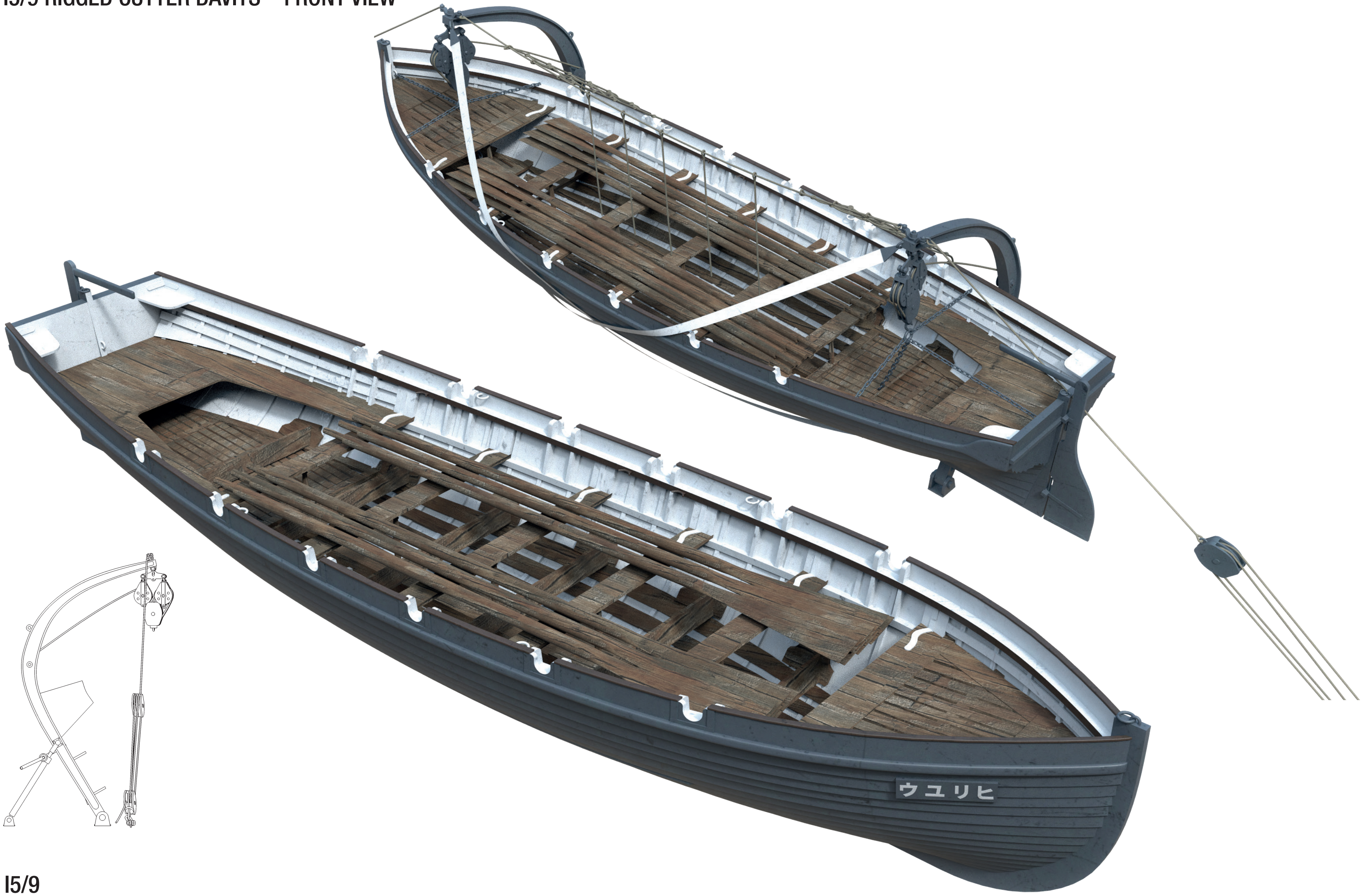


I5/7

9M ROW CUTTER (1/75 SCALE)

I5/8 RIGGED CUTTER DAVITS – PLAN

I5/9 RIGGED CUTTER DAVITS – FRONT VIEW



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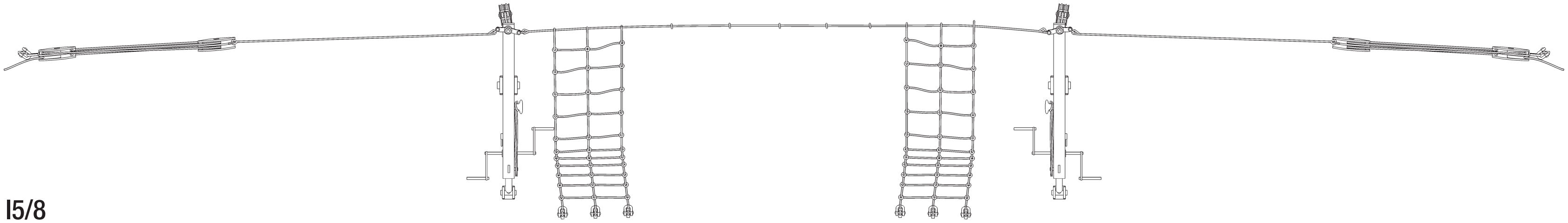


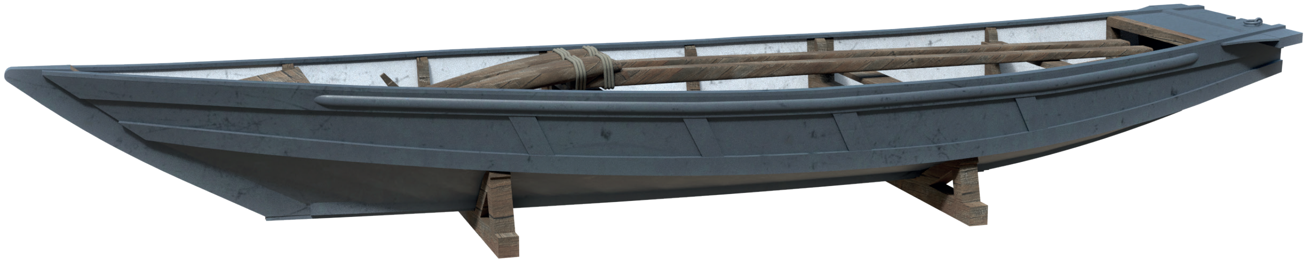
I5/8

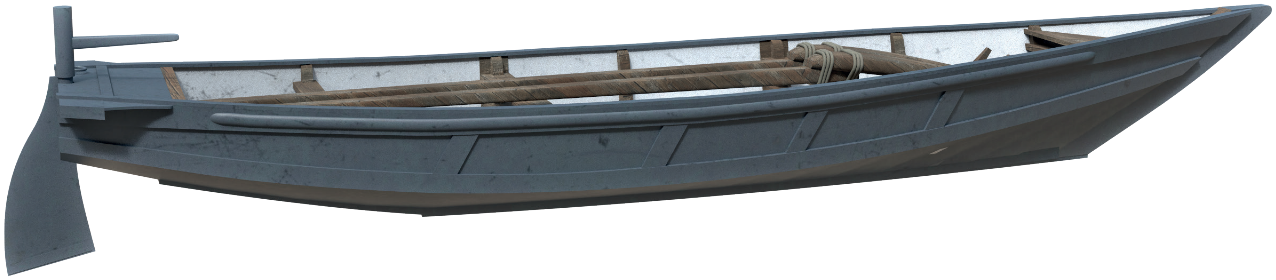
ウユリヒ

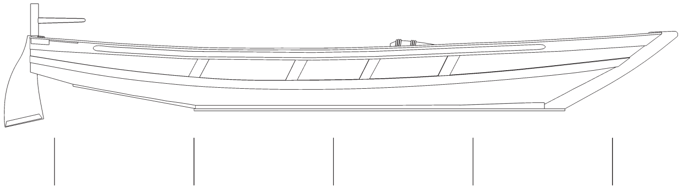
6M ROW SAMPAN (1/75 SCALE)

6メートル通船 – ROKU MĒTORU TSŪSEN

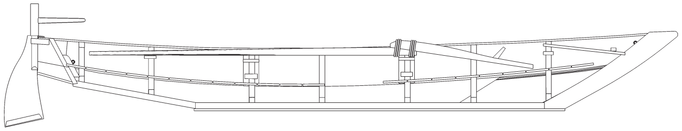
I6/1 PROFILE
I6/2 INTERNAL PROFILE
I6/3 PLAN



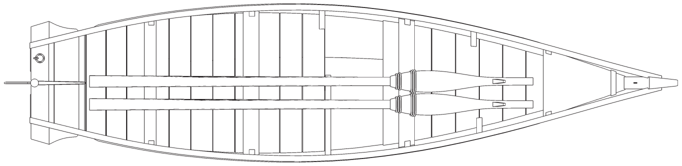




I6/1



I6/2



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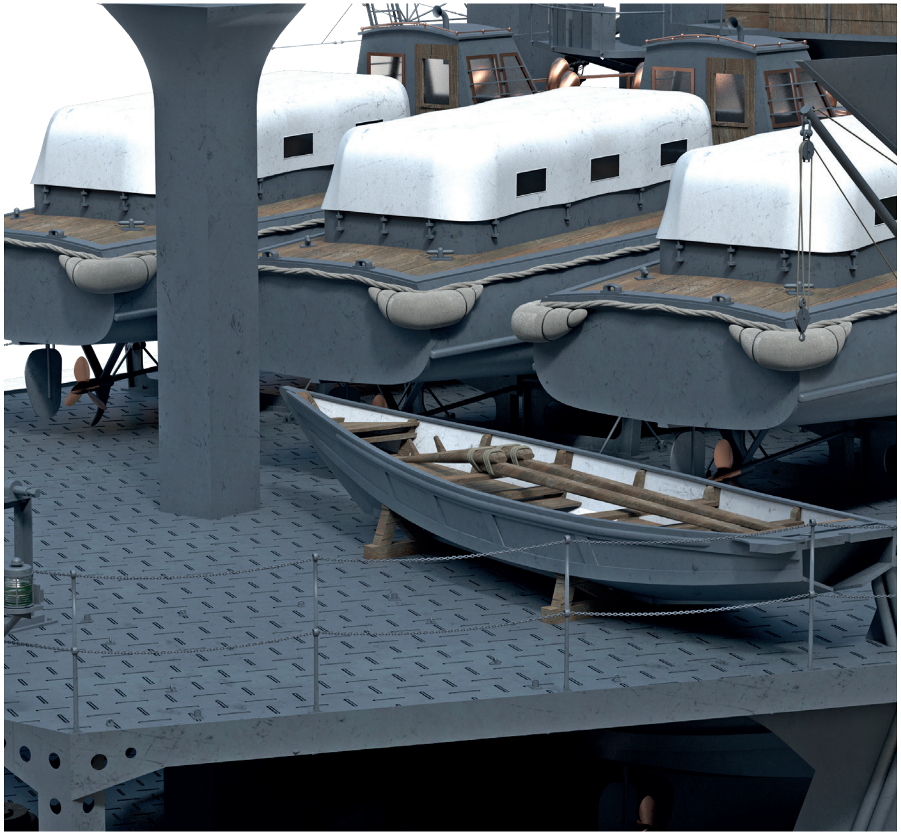
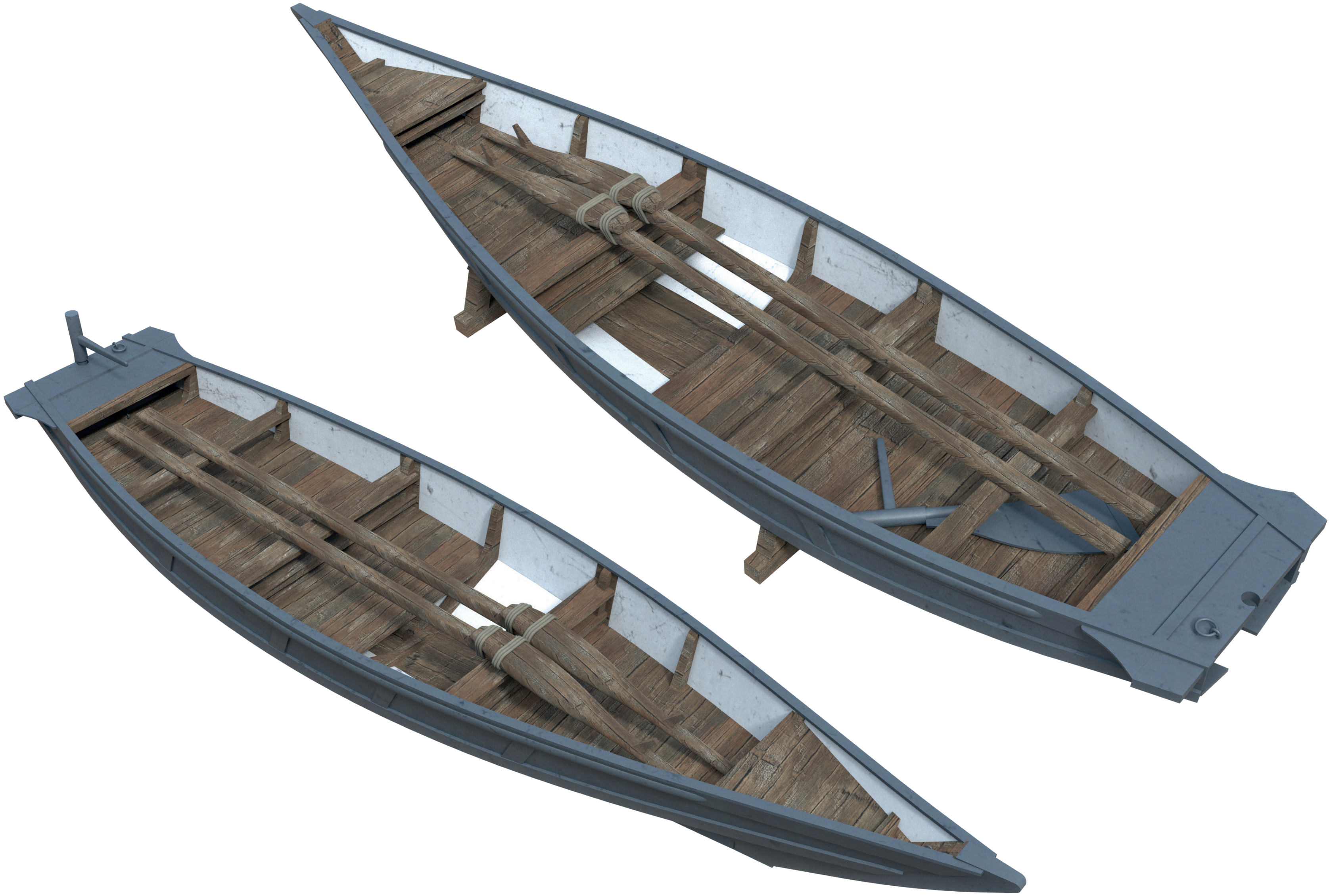
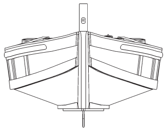


I6/4 FRONT VIEW
I6/5 BACK VIEW
I6/6 BODY PLAN
I6/7 BOAT CRADLE – PROFILE AND FRONT VIEW





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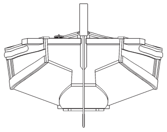

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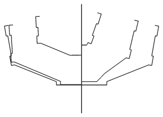

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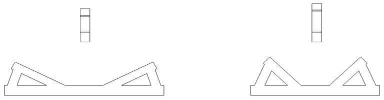

I6/7

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